# Precolonial centralisation, foreign aid and modern state capacity in Africa


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# Precolonial Centralization, Foreign Aid and Modern State Capacity in Africa

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**Abstract**

In this paper, we empirically explore the determinants of bureaucratic capacity in contemporary Africa. We connect the aid-governance literature with the historical, political economy and anthropological literature on African state formation. Our Ordinary Least Squares (OLS) results show that there is a positive and statistically significant relationship between precolonial centralization and bureaucratic quality in Africa from the mid-1990s onwards. Before the mid-1990s there is no such relationship. We also find that the often negative and statistically significant effect of aid dependence on bureaucratic capacity disappears, once we control for precolonial centralization. The OLS results survive a set of robustness tests, including the addition of several control variables and instrumental variable estimation using a variety of instruments suggested in previous research. As the colonial period is slowly fading, the influence of precolonial political institutions on modern state capacity is reasserting itself. Our results provide further evidence for the importance of precolonial centralization in our understanding of present day economic and political developments on the continent.

**Key words:** Africa • Foreign Aid • Precolonial Centralization • State Capacity

**Discipline:** Development Economics • Political Economy • Political and Economic History

**JEL Classification Numbers:** F35 • H10 • N47 • O11 • O55 • Z13

## 1. INTRODUCTION

The functioning of the state is one of the core issues in economic development (Weber, 1922). A major strand in the political science and economics literature highlights the importance of state capacity for raising taxes, protecting property rights, and ultimately for economic growth and development (Acemoglu, Johnson, & Robinson, 2001, 2002; Besley & Persson, 2010; Dincecco & Prado, 2012; Evans & Rauch, 1999). Findings from this literature help us understand why some regions are more prosperous than others. There is also general agreement that present-day low income levels in Africa can be explained in part by dysfunctional state institutions (Acemoglu & Robinson, 2010; Bates, 2008; Meredith, 2005). Surprisingly, there has been little theoretical or quantitative research on (i) the mechanisms that are conducive to state capacity building and (ii) the persistence of weak states (Acemoglu, Ticchi, & Vindigni, 2011; Besley & Persson, 2009, 2011).

In this paper, we empirically explore the determinants of bureaucratic capacity in contemporary Africa.[1] By bureaucratic capacity, we mean a state with an effective bureaucracy. Our point of departure is a "Weberian bureaucracy which is structured along impersonal, technocratic, hierarchical lines. Its written records provide a strong institutional memory, and its personnel has formal salaries, relies on standard operating procedures and knowledge-based rules, and answers to superiors who (ideally) take decisions according to impersonal, technocratic criteria" (Bräutigam, 2008, p. 15). There is broad consensus among scholars that bureaucratic capacity can be regarded as one of the most important aspects of state capacity (Cingolani, Thomsson, & De Crombrugghe, 2015; Evans & Rauch, 1999; Hendrix, 2010).

In this study, we focus on the role of foreign aid and precolonial centralization in shaping bureaucratic quality. Foreign aid is often suggested as one of the determinants of bureaucratic capacity building in Africa. A large number of international financial institutions, aid agencies and policy experts have identified public sector capacity building as a core objective and crucial element if African governments are to achieve their goals of poverty reduction and socio-economic development. As Fukuyama (2004) puts it, "the ability to shore up or create from whole cloth missing state capabilities and institutions has risen to the top of the global agenda" (p. 18). Several empirical studies have investigated the links between foreign aid and (i) economic growth, (ii) poverty reduction, (iii) democratization or (iv) good governance, yielding at best mixed results (Burnside & Dollar, 1997, 2000; Collier & Dollar, 2002; Djankov, Montalvo, & Reynal-Querol, 2008; Easterly, Levine, & Roodman, 2004).

[1] Unless specified otherwise, the term 'Africa' refers to the entire continent (i.e. induding both North Africa and Sub-Saharan Africa).

Our study empirically examines the relationship between the degree of dependence on foreign aid and *state capacity*, a fundamentally different concept than the concept of good governance. In our attempt to investigate the link between foreign aid and bureaucratic capacity, another variable – precolonial political centralization – comes out as important. An emerging empirical literature has documented a positive and robust link between precolonial political centralization and (i) economic development (Michalopoulos & Papaioannou, 2013, 2014, 2015), (ii) public goods provision (Gennaioli & Rainer, 2007; Osafo-Kwaako & Robinson, 2013) and (iii) institutional quality in Africa (Gennaioli & Rainer, 2006).

In our dynamic analysis we start by looking at the proximate determinants of state capacity that can explain variations in the *change* of bureaucratic quality over time. We show that for the period 1984-2014, high degrees of dependence on international aid appear to undermine bureaucratic quality of recipient countries when not controlling for precolonial centralization. Our results are similar to previous empirical findings and seem to support the view taken by aid pessimists (e.g. Bauer, 1975; Easterly, 2006; Moyo, 2009). However, in our static analysis, we examine the deep determinants of the *level* of bureaucratic quality in 2014, and we find that precolonial centralization trumps everything else. On average, a higher level of precolonial centralization is associated with a stronger bureaucratic quality in 2014.

Motivated by this finding of our static analysis, we then extend our dynamic analysis by also controlling for precolonial centralization. After controlling for precolonial centralization, the aid dependence variable loses most of its explanatory power. At the same time, we find a positive and highly statistically significant relationship between precolonial centralization and improvements in bureaucratic quality.

We then subdivide our 30-year period into two sub-periods, 1984-1995 and 1996-2014. The results for the two sub-periods differ remarkably. For the early period, we do find a strong negative link between aid dependence and bureaucratic quality, even after controlling for precolonial centralization. The precolonial centralization variable in turn has little explanatory power. In the latter period, the negative effect of foreign aid is statistically significant in some specifications when not controlling for precolonial centralization, but when controlling for precolonial centralization, the aid dependence variable once again loses most of its explanatory power. We consistently find a strong link between precolonial centralization and improvements in bureaucratic quality between 1996 and 2014. Our results remain intact after using additional controls.

We then show that our results remain robust when using an alternative estimation strategy. We use a TseTse Suitability Index (TSI) constructed by Alsan (2015) as an instrumental variable for precolonial centralization in the static analysis, in order to control for the possibility of omitted variable bias. Our econometric analysis shows that endogeneity concerns are to a large extent unwarranted and we therefore continue to treat precolonial centralization as exogenous for the rest of the empirical analysis. In the dynamic analysis, foreign aid is instrumented by the initial development level and population, in order to control for possible reverse causation. Our empirical findings provide further evidence for the historical relevance of the legacy of *precolonial* state characteristics for current economic and political developments on the African continent.

Our study is innovative in two ways. First, we connect the aid-governance literature with the historical, political economy and anthropological literature on African state formation. Second, we construct an instrument for precolonial centralization at the national level to account for potential endogeneity. Moreover, our key empirical findings are also twofold. First, we show that there is a positive and statistically significant relationship between precolonial centralization and state capacity in Africa from the mid-1990s onwards. Before the mid-1990s there is no such relationship. Second, we find that the statistically significant effect of aid on state capacity disappears for the full and recent period, once we control for precolonial centralization.

## 2. RELATED LITERATURE

In this section we will first briefly discuss the concept of state capacity and its different dimensions. Moreover, we will highlight the theoretical and methodological differences between the concepts of good governance and state capacity (section 2.1). In sections 2.2 and 2.3, we will explore the proximate and deep determinants of modern state capacity, respectively.

### 2.1. State capacity in its broader context

Definitions of good governance are typically captured by desirable attributes of public administration such as low levels of corruption, adequate supply of public goods, improvements in voice and accountability or equality before the law. Most scholars therefore use the term 'good governance' to refer to its normative component, namely decision-making practices which are considered ethically desirable (Kaufmann, Kraay, & Zoido-Lobatón, 1999). Other scholars use the term 'governance' to refer to a subset of desirable policies (Rodrik, 2000). Academic scientists have so far not been able to clarify what "good governance" actually means at the conceptual

level. Unfortunately, lack of objective data and absence of an universal definition for the concept of "good governance" inevitably lead to ambiguous results limiting its usefulness.

While the concept of state capacity is often proxied through common good governance indicators such as rule of law, control of corruption, protection of property rights, etc., we argue that state capacity is an important and separate dimension of the quality of government. The concept of state capacity avoids normative conceptions about what the state ought to do or how it ought to do it. The term 'state capacity' generally refers to a variety of dimensions of state power, such as coercive/military, fiscal, administrative, legal, political and relational/territorial coverage. Hendrix (2010) concludes that (1) survey measures of bureaucratic quality and (2) taxation capacity are the most theoretically and empirically justified.

The fiscal dimension of state capacity emphasizes the ability of the state to collect taxes from its citizenry (Levi, 1988; Tilly, 1975). Commonly used proxies for fiscal capacity in both the theoretical and empirical political economy literature are (i) the share of direct taxes in total tax revenues or (ii) tax revenue as a percentage of gross domestic product (GDP) (Besley & Persson, 2008; Dincecco & Prado, 2012; Tammen & Kugler, 2012). Those indicators, however, suffer from multiple shortcomings: First, those measures do not only measure the capacity to tax, but also the willingness to tax. Normative preferences of the population about the optimal level of taxation may vary quite significantly. Second, governments in countries with natural resources may find it fairly easy to collect taxes from their citizenry provided that they have enough coercive capacity to protect the resources.

We focus on the administrative component of state capacity in our analysis for the following reasons. First, bureaucratic quality can be regarded as a precondition for taxation capacity. Second, the measure is available over a long period of time. Third, in contrast to the fiscal dimension of state capacity, bureaucratic quality is a conceptually clearer measure of state capacity. And fourth, the bureaucratic dimension of state capacity is perhaps the most widely used in the political economy literature, probably due to the strong theoretical legacy of Max Weber (1922).[2]

The most commonly used proxy for administrative state capacity is bureaucratic quality, a concept deeply rooted in the Weberian view of the modern state and the necessity for a professional bureaucracy. A professional bureaucracy outlives rulers and is crucial for the

[2] The theoretical and empirical associations between bureaucratic autonomy and the various measures of state capacity that scholars have presented are discussed by Cingolani, Thomsson and De Crombrugghe (2015).

impersonal implementation of politics. Moreover, countries with high bureaucratic quality possess bureaucracies that tend to be somewhat autonomous from political pressure and tend to have developed extensive mechanisms for recruitment and training (Evans & Rauch, 1999; Rauch & Evans, 2000).

### 2.2. Proximate determinants of state capacity

The pioneering work on state formation and the historical determinants of state capacity is the bellicist hypothesis put forward by Tilly (1975, 1990). One of the central paradoxes in European state formation is the fact that "the pursuit of war and military capacity, after having created national states as a sort of by-product, led to a civilianization of government and domestic politics" (Tilly, 1990, p. 206). A large number of African states, however, gained independence without the need to combat. Most of the conflicts in post-colonial Africa were regional, e.g. intrastate wars. Since African states have seldom fought wars of conquest, e.g. interstate wars, their governments faced little significant external threats. As a result, the pressure to build an effective central administration that levies taxes and protects private property was significantly lower if compared to the European case (Bates, 2001; Herbst, 1990).[3] Herbst postulates that

"(…) the symbiotic relationship that war fostered in Europe between tax collection and nationalism is absent in Africa, precisely because there is no external threat to encourage people to acquiesce in the state's demands, and no challenge that causes them to respond as a nation" (Herbst, 1990, p. 131).

Another strand of the political economy literature establishes a negative relationship between ethnic tensions and institutional capacity (Alesina, Devleeschauwer, Easterly, & Kurlat, 2003). In several political economy models, large resource wealth is related to higher risk of civil war concomitant with weakened state capacity (Besley & Persson, 2011; Fearon & Laitin, 2003). Countries with natural resource abundance, particularly large oil wealth, tend to suffer from a political 'Dutch Disease' (Fearon & Laitin, 2003; Wantchekon, 2002). High commodity dependence generates little incentives to invest in fiscal capacity as resource rents can easily be appropriated by the government elites (Jensen, 2011). In his study, Humphreys (2005) uncovers a positive relationship between state weakness and civil war onset at all positive levels of oil production. Finally, according to the modernization theory, positive changes in GDP per capita are said to positively contribute to institutional capacity (Lipset, 1959).

[3] The commonly held view that external war threat is conducive to state building, while domestic violence is detrimental for state capacity is also captured in recent political economy models (Besley & Persson, 2008, 2011).

Numerous scholars attribute a part of the disempowerment of central administration and decline in state institutional capacity in several African countries to foreign aid (e.g. Ayittey, 2005; Bauer, 1975; Easterly, 2006; Moyo, 2009). According to those aid pessimists, state institutions in recipient countries have lost a significant amount of decision-making power through large aid dependence as active policy making was partly or entirely externalized. The nature of the African state made it perfectly possible that the neopatrimonial regime could coexist with a Weberian rational bureaucracy (van de Walle, 2001). Moreover, van de Walle is convinced that the "institutionalization of crisis management over a twenty-year period has disempowered central administrations for the benefit of donor experts and ad hoc domestic decision-making structures. The decline of state capacity has invigorated patrimonial tendencies throughout the region" (p. 275).

Several studies have empirically supported the view of aid pessimists. Among others, studies by Djankov, Montalvo and Reynal-Querol (2008) as well as Rajan and Subramanian (2007) have aimed at quantifying the negative effect of development assistance on democratization and governance, respectively. The foreign aid literature that empirically explores the causal link between aid dependency and *state capacity* remains surprisingly sparse. Knack (2001) finds a robust statistical relationship between high aid levels in Africa and deteriorations in bureaucratic quality. Similarly, Bräutigam and Knack (2004) find robust statistical evidence that higher aid levels correspond with larger declines in tax revenues as a share of GDP in Sub-Saharan Africa. Knack and Rahman (2007) explore how competitive donor practices can erode administrative capacity in recipient countries. A recent paper by Selaya and Thiele (2012) studying the impact of foreign aid on bureaucratic quality overcomes an important drawback of the existing literature: it focuses on disaggregated flows of aid rather than on a single aid aggregate. The authors find that the functioning of the bureaucracy is adversely affected by grants, but not by loans.

A more nuanced view is taken by another group of scholars who are less pessimistic about the consequences of foreign aid. We will call them conditional optimists. Their work shows that large quantities of development assistance do not systematically affect the quality of policies or institutional capacity (Alesina & Dollar, 2000; Rodrik, 1996). Those scholars argue that the return of aid is highest in sound institutional environments and lowest in poor institutional environments, regardless of whether 'environment' is defined in terms of prudent macroeconomic policy or a broader set of political and economic institutions (Burnside & Dollar, 1997, 2000; Dollar & Pritchett, 1998). While Collier and Dollar (2002) admit that aid could become detrimental beyond a certain threshold point even in a 'good' policy environment, "the

point at which aid starts to have negative effects is well above the range pertinent for most of Africa" (Collier, 1999, p. 531).[4]

The foreign aid literature summarized in this section views institutional quality as a dynamic and malleable social construct determined by current events and present-day policies. Those scholars regard international financial communities, international policymakers, aid agencies, and NGOs as important stakeholders in the attempt to promote state capacity improvement on the African continent, for the better or for the worse. In the next section, we will discuss some of the deep determinants of contemporary state capacity in Africa.

### 2.3. Deep determinants of state capacity

A major factor which is positively correlated with state formation – characterized, among other things, by political centralization, a monopoly of violence, tax monopoly and effective bureaucratic institutions – in Europe is population density. According to Bairoch (1988), increased urbanization and better transportation networks during the Industrial Revolution in Europe significantly promoted state formation and modern state capacity. The high population density in Europe made land relatively scarce and therefore very attractive to control (Tilly, 1990). In contrast, low population density and land abundance impaired political centralization in major parts of Africa as many African governments faced difficulties to penetrate and control major parts of their hinterlands (Mamdani, 1996). As low population densities make territorial conflicts less likely, governments have fewer incentives and less means to extend their rule beyond the capital cities and a few other population centers (Bates, 2001; Herbst, 2000).

In many developing countries, the legitimacy of modern state institutions remains weak as the internal pacification of the territory has not yet been completed, partly because the impetus for modern state formation and institutional capacity development in developing countries was colonial penetration (Szirmai, 2015; Young, 1994). In fact, one of the most salient features of African contemporary state bureaucracy is its inherited colonial legacy. An important strand of quantitative and qualitative literature has stressed the long-term effects of colonial intrusion on contemporary development, public goods provision and state capacity in Africa (Acemoglu et al., 2001; Frankema & van Waijenburg, 2014; Huillery, 2009, 2010; Young, 1994). One of the negative consequences of colonization is the arbitrary nature of post-colonial boundaries in the process of colonial state formation (Alesina, Easterly, & Matuszeski, 2011; Ayittey, 2005; Englebert, 2000). Yet another strand of literature goes further back in time, emphasizing the

[4] Please consult chapter 14 of Szirmai (2015) for a recent survey on the theoretical and empirical literature on foreign aid.

importance of the slave trade in explaining the weakness of contemporary African states and the lack of economic development (Manning, 1990; Nunn & Wantchekon, 2011; Nunn, 2008).

Other scholars have stressed the importance of environmental and geographic constraints – e.g. climate, topography, geology and biogeography – that have conditioned the progress of economic and institutional development (Engerman & Sokoloff, 1997; Gallup, Sachs, & Mellinger, 1999). Diamond (1997) argues that differences in prehistoric biogeographical conditions between Eurasia and Africa have influenced the timing of the transition from hunter-gatherer societies to settled agriculture, subsistence farming and ultimately state formation.

A growing body of research, however, highlights the importance of precolonial ethnic institutions for contemporary public goods provision and economic development in Africa. On average, better provision of basic public goods (education, health, and infrastructure) is found in African regions with more centralised precolonial institutions (Gennaioli & Rainer, 2007; Osafo-Kwaako & Robinson, 2013). Moreover, Michalopoulos and Papaioannou (2013, 2014) attribute a higher regional development in the historical homelands of ethnicities to centralized, hierarchical, precolonial political institutions. Precolonial centralization is a robust correlate of regional development outside Africa as well: Studying the historical formation of Native American reservations, Dippel (2014) uncovers a negative link between forced integration of autonomous polities into a system of shared governance and long-run economic development. Gennaioli and Rainer (2006) assess whether early statehood in Africa is associated with a higher quality of government at the national level. Their results suggest that African countries with higher precolonial centralization show lower levels of corruption and a higher rule of law today.

The research by the aforementioned group of scholars is based on qualitative evidence by the (i) historical, political science literature and the (ii) anthropology literature on African state formation. The authors of the former group emphasize the continuity of precolonial institutions in African history (Boone, 2003; Mamdani, 1996). In the latter group, scholars distinguish between two political systems in Africa: Some ethnic groups possessed highly centralized systems characterized by centralized authority, administrative machinery, and judicial institutions while other ethnic groups lived in less centralized systems characterized by cleavages of wealth and no sharp divisions of rank, status, or wealth (Fortes & Evans-Pritchard, 1940, p. 5).[5]

Building on the literature reviewed in this section, we connect the aid-governance literature with the historical, political economy and anthropological literature on African state formation. Our

[5] The distinct precolonial political systems have emerged from unique socio-economic and political trajectories of the respective ethnic groups. Consequently, the varying precolonial political systems should be regarded as "optimal" solutions to the respective problems faced by those particular societies.

work therefore focuses on one of the proximate and one of the deep determinants of modern state capacity in Africa, namely foreign aid and precolonial political centralization.

## 3. DATA AND METHODOLOGY

We pursue two lines of analysis, one static and one dynamic. For the static analysis, our dependent variable is the *level* of bureaucratic quality in 2014. For the dynamic analysis, we will use the *changes* in bureaucratic quality over time as our dependent variable. The bureaucratic quality index used in this analysis comes from the PRS Group's International Country Risk Guide (ICRG). It measures the institutional strength and the extent to which the bureaucracy tends to minimize policy shifts when governments change. The index is an expert survey measure and must therefore be regarded as a subjective indicator. It reflects perceptions of changes in bureaucratic quality, not actual changes. According to Hendrix (2010), this index "most closely captures the important components of the theoretical construct of bureaucratic/administrative capacity: professionalism, insulation from political pressure, and efficacy in delivering government services" (p. 278). The index ranges from zero to four and covers 37 African countries for the time period 1984-2014.[6] Countries with high bureaucratic quality are somewhat autonomous from political pressure and tend to have developed mechanisms for recruitment and training (Evans & Rauch, 1999; Rauch & Evans, 2000). We regard the index as the probably most satisfactory measure of bureaucratic quality.

Table 1 shows variations in bureaucratic quality across nations and over time. In terms of average bureaucratic quality over the period 1984-2014, countries like South Africa, Kenya, Namibia, Botswana and Ghana are among the high performing countries. In contrast, countries like Sierra Leone, Togo, Democratic Republic of Congo (DRC), Somalia, Liberia and Mali are among the low performing countries. In terms of change, Botswana and Ghana are also among those countries that have witnessed major improvements of bureaucratic quality over time, while other countries like South Africa or Côte d'Ivoire have witnessed major deteriorations in their administrative capacity. How to explain those differences in performance over time is a major question to be addressed in this paper.

[6] The first observation for the countries of Botswana, Burkina Faso, Madagascar, Sierra Leone and Somalia is 1985. The coverage for Gambia and Guinea-Bissau starts in 1986. For those countries, we will assume that the starting value in 1984 equals the value in 1985 or 1986, respectively. Data for Namibia is available from 1990 onwards.

**Table 1: Bureaucratic Quality in Africa – across countries and over time**

| Country | Average Bureaucratic Quality, 1984-2014 | Country | Change in Bureaucratic Quality, 1984-2014 |
|---|---|---|---|
| | | High performing countries | |
| South Africa | 2.83 | Ghana | 2.50 |
| Kenya | 2.39 | Botswana† | 2.00 |
| Namibia* | 2.36 | Gambia‡ | 2.00 |
| Botswana† | 2.24 | Guinea | 2.00 |
| Ghana | 2.18 | Namibia* | 2.00 |
| Zimbabwe | 2.14 | Uganda | 2.00 |
| Gabon | 2.13 | Ethiopia† | 1.50 |
| Morocco | 2.09 | Guinea-Bissau‡ | 1.50 |
| Tunisia | 2.00 | Malawi | 1.50 |
| Egypt | 1.97 | Niger† | 1.50 |
| | | Low performing countries | |
| Zambia | 0.98 | | |
| Ethiopia† | 0.78 | Gabon | -0.17 |
| Tanzania | 0.75 | Morocco | -0.42 |
| Sudan | 0.74 | Angola | -0.50 |
| Sierra Leone† | 0.48 | Zimbabwe | -0.83 |
| Togo | 0.44 | Cameroon | -0.92 |
| DRC | 0.38 | Senegal | -1.00 |
| Somalia† | 0.16 | Togo | -1.00 |
| Liberia | 0.00 | South Africa | -2.00 |
| Mali | 0.00 | Cote d'Ivoire | -3.00 |

*Note*: † refers to period 1985-2014; ‡ refers to period 1986-2014; * refers to period 1990-2014.
*Source*: Own calculations based on data from the PRS Group's International Country Risk Guide (ICRG)

Our main explanatory variables for the analysis are (i) foreign aid dependence and (ii) precolonial centralization. Our measure for aid dependence is constructed in the following way: we take annual total DAC-ODA disbursements in current dollars from the OECD/DAC database and divide them by the GDP (in current dollars) of the respective recipient country. GDP data comes from Maddison (2010) and the World Development Indicators published by the World Bank. Several previous studies within the foreign aid literature have used the same or similar variables (Bräutigam & Knack, 2004; Djankov et al., 2008). Table 2 presents the largest and smallest aid recipients in Africa over the time period 1984-2014. Somalia, Liberia, Mozambique, Sao Tomé and Principe, Guinea-Bissau and Cape Verde received the largest amounts of ODA as a percentage of GDP. Libya, Tunisia, South Africa, Algeria, Nigeria and Mauritius have received the least amounts of ODA as a percentage of GDP.

**Table 2: Ranking of the largest and smallest aid recipients in Africa, 1984-2014**

| Country | Average ODA/GDP (%) | Country | Average ODA/GDP (%) |
|---|---|---|---|
| Somalia | 24.02 | Libya | 0.07 |
| Liberia | 21.70 | Tunisia | 0.10 |
| Mozambique | 19.44 | South Africa | 0.17 |
| Sao Tomé and Principe | 19.40 | Algeria | 0.25 |
| Guinea-Bissau | 18.69 | Nigeria | 0.73 |
| Cape Verde | 16.76 | Mauritius | 0.94 |

*Source:* Own calculations based on OECD DAC Statistics and World Development Indicators

Our proxy for the degree of precolonial centralization comes from Gennaioli and Rainer (2007). The authors developed a centralization index at the national level for 48 countries in Africa. The index aims to capture the degree of political complexity on the continent in precolonial times. Their data comes from Murdock (1967) and from the Atlas Narodov Mira, a Soviet ethnographic source (Bruk & Apenchenko, 1964).[7] Murdock (1967) published an Ethnographic Atlas that coded around 60 variables, capturing cultural, geographical, and economic characteristics of 1270 ethnicities around the world. The information is derived from a variety of individual field-studies done by anthropologists between 1850 and 1950. It is worth noting that the information for every ethnic group is pinpointed to the earliest period for which satisfactory data existed in order to avoid the acculturative effects of contacts with Europeans (Gennaioli & Rainer, 2006, 2007). Gennaioli and Rainer measure precolonial political institutions using Murdock's "Jurisdictional Hierarchy Beyond the Local Community Level" index. The index is an ordered variable, ranging from 0 to 4. It describes the number of political jurisdictions above the local level for each ethnicity.[8] A zero score indicates stateless societies "lacking any form of centralized political organization." A score of 1 designates petty chiefdoms; a score of 2 is associated with paramount chiefdoms; and a score of 3 or 4 refers to ethnic groups that were part of large states. The classification resembles that of Diamond (1997), who distinguished between four different social structures: bands, tribes, chiefdoms, and centralized states.

An ethnic group is defined as "centralized" if it has 2, 3, or 4 jurisdictional levels above the local community. An ethnic group is defined as "fragmented" if it has "only" 0 or 1 jurisdictional levels above the local community. While highly centralized ethnic groups "have developed a form of government with large, territorially integrated political entities, (…) fragmented ethnic groups have been traditionally organized in a multitude of small and fragmented, political entities, often lacking any political integration above the local village" (Gennaioli & Rainer, 2007, p. 188). Prime

[7] In their study, Gennaioli and Rainer (2007) focus on Sub-Saharan Africa exduding South Africa which reduces their sample to 42 countries.
[8] The local level usually refers to the village level.

examples of highly centralized groups are the Kaffa (Ethiopia), the Luba (DRC) or the Yoruba (Nigeria).[9] Gennaioli and Rainer (2006, 2007) then matched 300 African ethnic groups to ethnic groups listed in the Atlas Narodov Mira, which gives the most detailed division of the world population into different ethnic groups. Using the ethnic composition of every African country from the Atlas Narodov Mira, the authors then calculated the share of each country's non-European population belonging to centralized ethnic groups. For each country, the index measures the share of the non-European population that belongs to indigenously "centralized" ethnic groups. The scale ranges between 0 and 1, whereby a higher value corresponds to a more "centralized" national state.[10] Table 3 summarizes the level of precolonial centralization for those African countries where data is available.

**Table 3: Precolonial political centralization in Africa**

| Country | Centralization | Country | Centralization |
|---|---|---|---|
| Comoros | 1 | Angola | 0.635 |
| Lesotho | 1 | Uganda | 0.634 |
| Swaziland | 1 | Togo | 0.622 |
| Burundi | 0.995 | Niger | 0.582 |
| Algeria | 0.990 | Sudan | 0.576 |
| Egypt | 0.990 | Congo Republic | 0.536 |
| South Africa | 0.990 | Madagascar | 0.505 |
| Rwanda | 0.982 | Nigeria | 0.478 |
| Tunisia | 0.980 | Gambia | 0.426 |
| Zimbabwe | 0.965 | Guinea | 0.406 |
| Libya | 0.940 | Chad | 0.384 |
| Botswana | 0.893 | Burkina Faso | 0.338 |
| Malawi | 0.861 | Cameroon | 0.316 |
| Mauritania | 0.858 | Guinea-Bissau | 0.214 |
| Mozambique | 0.844 | Equatorial Guinea | 0.211 |
| Ethiopia | 0.843 | Kenya | 0.172 |
| Morocco | 0.810 | Central African Republic | 0.144 |
| Zambia | 0.743 | Djibouti | 0.133 |
| Benin | 0.695 | Mali | 0.115 |
| Senegal | 0.694 | Cote d'Ivoire | 0.082 |
| Tanzania | 0.669 | Somalia | 0.034 |
| Namibia | 0.664 | Gabon | 0.011 |
| Ghana | 0.651 | Sierra Leone | 0.008 |
| DRC | 0.649 | Liberia | 0 |
| | | AVERAGE (non-weighted) | 0.587 |

*Note:* The precolonial political centralization index measures the share of the Non-European population that had centralized political institutions before colonization.
*Source:* Gennaioli and Rainer (2007)

[9] The ancient kingdom of Kaffa (c1390–1897) was an early modern state located in what is now Ethiopia. The Luba Empire (c. 1585–1885) was once an influential Central African state in what is now the Katanga Province of the Democratic Republic of the Congo. The Oyo Empire (c. 1400–1895) was a Yoruba empire of what is today western and northern Nigeria. It became one of the largest West African states in precolonial times.
[10] In order to focus on the role of indigenous African institutions, Gennaioli and Rainer (2006, 2007) exduded Europeans. The results, however, remain unchanged if Europeans are also induded in the centralization index.

Lesotho, for example, is a highly centralized country as both of its ethnic groups – the Sotho and the Zulu – are highly centralized groups. Liberia instead is a highly fragmented country as both of its ethnic groups – the Kru and the Peripheral Mende – are highly fragmented. Most countries, however, are home to both centralized and fragmented groups. A recent study that cross-validated Murdock's data by crucially examining the African historiography suggests that "the jurisdictional hierarchy index – while not perfect – is in accordance with works describing the degree of political complexity in precolonial Africa" (Michalopoulos & Papaioannou, 2013, p. 119).

Dynamic analysis

In our dynamic analysis, we will empirically investigate the relationship between foreign aid dependence and the evolution of bureaucratic capacity in Africa. Our dynamic analysis covers the years 1984-2014.

Our basic regression specification for the dynamic analysis is:

$$\Delta BQ_{i,1984-2014} = \beta_0 + \beta_1 * BQ_{i,1984} + \beta_2 * \overline{Aid\ Dependence}_{i,1984-2013} + \varepsilon_i \quad (1)$$

where $\Delta BQ_{i,84-14}$ is the change in bureaucratic quality in country i over the time period 1984-2014, $BQ_{i,84}$ is the level of initial bureaucratic quality in country i, $\overline{Aid\ Dependence}_{i,84-13}$ is the average level of DAC-ODA aid as a percentage of GDP over the time period 1984-2013. Parameter $\beta_2$ captures the relationship between aid dependence and the change in bureaucratic quality.

This specification limits the extent of problems related to omitted variable bias. By regressing the change of bureaucratic quality over time on its initial level, we capture regression-to-the-mean effects and control for the opportunity of initially high- and low-performing countries to decrease and increase their scores, respectively. Moreover, controlling for the initial level of bureaucratic quality helps us to control for a large set of historically slow moving factors explaining differences in the level of bureaucratic quality across countries, such as ethnolinguistic fractionalization, geographic factors, or unobservable characteristics like culture.

We extend Equation (1) by including a vector of time-varying covariates of bureaucratic quality, $X_{i,84-13}$, in order to control for potential confounding factors:

$$\Delta BQ_{i,84-14} = \beta_0 + \beta_1 * BQ_{i,84} + \beta_2 * \overline{Aid\ Dependence}_{i,84-13} + \beta'_3 * X_{i,84-13} + \varepsilon_i \quad (2)$$

One important control variable is the extent of both domestic and external political violence in the host country. Domestic (and external) violence usually attracts a significant amount of development assistance – particularly humanitarian and post-conflict assistance. Failing to account for political violence can therefore produce a spurious correlation between aid levels and weakened state capacity. Data on both domestic and external political violence come from the Center for Systemic Peace (Marshall, 2014) and from the International Country Risk Guide (ICRG) by the PRS Group.[12]

We will also control for ethnic tensions. The data also comes from the ICRG. The index of ethnic tensions assesses the degree of tensions within a country attributable to racial, nationality or language divisions. One major advantage of the index from the PRS Group over several other popular ethnic fractionalization and polarization indices is the fact that it is time-variant.[13] [14]

Our proxy for oil wealth is an oil production dummy constructed by the authors. The variable measures the proportion of years, for each country, in which oil has been produced. For the time period 1984-2013, the oil-rich countries Angola and Sudan, for example, are coded as one, while non-oil countries such as Botswana or Ethiopia are coded as zero. Calculations are based on data from the US Energy Information Administration (EIA) Agency and Ross (2013).

Since the ICRG ratings on bureaucratic quality are subjective indicators, economic performance may influence the ratings even in the absence of a causal relation. If recipient countries witness economic growth (decline) concomitant with improving (worsening) state capacity and declining (rising) levels of development aid, controlling for changes in the development level is crucial to avoid a spurious correlation between aid dependence and bureaucratic quality. GDP per capita data is retrieved from Maddison (2010) and the World Bank Development Indicators.[15] A full description of the variables being used in the analysis is given in Appendix 1. Summary statistics for the static and dynamic analysis can be found in Appendix 2 (Table A2.1 and Table A2.2).[16] After having explored the proximate determinants of modern state capacity, we will investigate its deep determinants.

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[12] Data on political violence from the PRS Group's International Country Risk Guide (ICRG) is only available from 1984, however, and thus only used for robustness checks.

[13] Seminal contributions on ethnic, linguistic, and religious fractionalization using time-invariant indices include Alesina et al. (2003), Desmet, Ortuño-Ortín and Wacziarg (2012), Easterly and Levine (1997) as well as Montalvo and Reynal-Querol (2005).

[14] In the empirical anaylsis, we are using the average values of the domestic violence, external violence and ethnic tension indeces for each country over the time period 1984-2013.

[15] We are not using data from the Penn World Tables (PWT 8.0) because data is missing for six African countries. Out of those six countries, three countries are part of our analysis (Algeria, Libya and Somalia). Using PWT data would force us to give up on three observations in our already fairly small sample.

[16] This paper distinguishes between main tables and appendix tables. Main tables appear in the text while the annex tables can be found in the annex. Annex tables (but also figures) are coded A1, A2, A3, etc.

Static analysis

In our static analysis, we will explore to what extent contemporary African bureaucratic capacity in the year 2014 can be explained by deep historical factors. For our cross section, we use the level of bureaucratic quality in 2014 as our dependent variable. Our main variable of interest is the country-level measure of precolonial centralization. Our basic regression specification for the static analysis is:

$$BQ_i = \beta_0 + \beta_1 * precolonial\ centralization_i + \varepsilon_i \quad (3)$$

Parameter $\beta_1$ captures the relationship between precolonial centralization and the level of bureaucratic quality in 2014.

We extend Equation (3) by including a vector of covariates of bureaucratic quality, in order to control for potential confounding factors:

$$BQ_i = \beta_0 + \beta_1 * precolonial\ centralization_i + \beta'_2 * X_i + \varepsilon_i \quad (4)$$

This vector of covariates includes, among others, our proximate determinants from the dynamic analysis, most notably the average foreign aid dependence over time.[17] Besides foreign aid dependence, we also include the average values of domestic and external violence as well as oil production.[18] Another set of control variables includes geographic factors, namely latitude, logarithm of the percentage of mountainous terrain in the country, percent of cultivated land and mean distance to the nearest coastline or sea-navigable river. The data comes from Gallup, Sachs and Mellinger (1999) as well as Fearon and Laitin (2003).

We also control for prosperity in (i) the medieval ages and (ii) the post-colonial era. Our proxy for the former is population density in 1400 and is measured as total population divided by land area in millions of square kilometers.[19] Statistics on population density come from Parker (1997). Our proxy for the latter is the level of economic development in the entire post-independence period. It is captured by our control variable average GDP per capita between 1961 and 2013. The data comes from Maddison (2010) and the World Development Indicators.

[17] We take the average aid dependence for each country between 1961 and 2013 for those African countries that became independent in 1960 or before. For those countries that became independent after 1960, we take the average value of aid dependence between the year after the country's year of independence and 2013.

[18] Those variables are constructed in the same way as the foreign aid dependence variable (see Footnote 17).

[19] Based on previous work by Acemoglu, Johnson and Robinson (2002) as well as Ashraf and Galor (2011, 2013), we believe that using population density as proxy for gauging comparative economic development during the Middle Ages is sensible because technolgical advancement in the medieval period "brought about only transitory gains in per capita income, eventually leading to a larger but not richer population" (Ashraf & Galor, 2013, p. 5).

Moreover, we will account for the colonial legacy by using colonial origin dummies. Ethiopia and Liberia are the only two countries we classify as independent.[20] The former German colonies – Burundi, Cameroon, Rwanda, Tanzania and Togo – were taken over by new colonial rulers after the First World War. Consequently, we will divide them among the countries that took them over after 1918.[21] Morocco is considered as a former French colony, even though it was a joint protectorate of France and Spain. Moreover, we have classified Somalia as a UK colony, even if there were also (bigger) Italian and (smaller) French portions.[22]

An additional control variable in our main analysis is legal origin as there appears to be a strong correlation between legal rules, legal origin, economic outcomes and institutional quality (La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1999). The authors emphasize structural differences in the British common law or the French, German, or Scandinavian civil law. Their research findings suggest that the use of a more interventionist legal system, such as French civil law, is associated with inferior government performance. Legal systems in Africa either belong to the English common law or the French civil law family. The data comes from the same authors.

Our proxy for artificial state characteristics comes from Alesina et al. (2011). The authors develop two measures, (i) the *fractal* dimension and (ii) the *partitioned* dimension of state borders. Those measures proxy the degree to which borders are natural or artificial. The *fractal* variable captures the straightness or squiggliness of country borders. The rationale behind the construction of the fractal measure is based on the assumption that borders drawn with straight lines increase the chances that those borders were drawn artificially, while squiggly lines are less likely to be artificial. The *partitioned* variable is defined as "the percentage of a country's population that belongs to a partitioned group. The latter is a group that is present in two bordering countries" (Alesina et al., 2011, p. 260). Since the partitioned dimension turns out to be considerably more robust in their analysis, we will use the partitioned measure as our proxy for the level of artificial state characteristics in our main analysis.[23]

There are, of course, several other potential confounding factors used in the literature, such as slave trade (Manning, 1990; Nunn & Wantchekon, 2011; Nunn, 2008), the depth of experience

[20] The Italian Invasion of Abyssinia in 1935–36 resulted in Ethiopia's subjection to Italian rule. While Ethiopia was liberated in 1941, it still induded Eritrea until 1988 which was an Italian colony between 1890 and 1950. While Liberia was initially colonized by former African American slaves and their free black descendants, the country prodaimed its independence from North America in 1847 and has been a sovereign country ever since.

[21] Burundi and Rwanda became Belgian colonies, while Tanzania was under British rule after WWI. Cameroon and Togo were subject to a joint French and British mandate. We list Togo under French rule, because the country consists of the French portion only while the British part has been annexed to Ghana. We place Cameroon under France since it is currently a member of the CFA-franc zone. Our approach is very similar to the approach taken by Bertocchi and Canova (2002).

[22] Our empirical results largely remain intact when we dassify Somalia as an Italian colony.

[23] Our empirical results do not change when we replace the *partitioned* variable with the *fractal* measure.

with state-level institutions (Bockstette, Chanda, & Putterman, 2002; Putterman, 2007), vertical legitimacy (Englebert, 2000), constraints on the executive (Marshall, Jaggers, & Gurr, 2014), ethnolinguistic fractionalization and polarization (Easterly & Levine, 1997; Montalvo & Reynal-Querol, 2005), cultural heritage proxied by differences in religion (La Porta et al., 1999; Landes, 1998), gross public revenue per capita extracted from the citizenry during the colonial period (Frankema & van Waijenburg, 2014) or the amount of European settlements during colonial and modern times (Acemoglu et al., 2001; McEvedy & Jones, 1975). Those variables, however, will not be discussed in great-depth in this paper due to limited space. We have performed additional regression estimations controlling for those variables but the results do not change in any fundamental way. The additional empirical results not reported in the main text can be found in Appendix 3.

## 4. EMPIRICAL EVIDENCE

In this section we report our main results. In section 4.1, we present our empirical findings for the dynamic analysis. Our results from the static analysis will be discussed in section 4.2. We will then return to the dynamic analysis in section 4.3.

### 4.1. Effects of Aid Dependence on Changes in Bureaucratic Capacity

To examine the relationship between development assistance and state capacity between 1984 and 2014, we regress the change of bureaucratic quality over that 30 year period on foreign aid dependence (Table 4).

In our base specification (column 1), the baseline estimate of -5.55 can be interpreted as follows: a country A that is on average ten percent more aid dependent than its counterpart over the entire period is expected to witness a deterioration in its bureaucratic quality by 0.56 points, ceteris paribus. This effect is quite substantial. By merely controlling for initial bureaucratic quality and foreign aid dependence, 70 percent of the variation in the change of bureaucratic quality is explained by our model. We add several control variables to our regressions. In column (2), we control for the percentage change in GDP per capita over the period 1984-2013. While the coefficient of GDP per capita is significant at the 10 percent level, the effect of foreign aid dependence on bureaucratic quality remains virtually unchanged. We control for ethnic tensions, domestic and external violence, as well as oil wealth in columns (3), (4) and (5). The coefficients of the control variables have their expected sign. Moreover, the coefficients are generally statistically significant at the five percent level. The exception is the oil production variable. Its

coefficient, while having the expected sign, is not statistically significant. Moreover, we find a strong regression-to-the-mean effect. Holding all other things constant, country A with an initial bureaucratic quality score 1 unit higher than country B is expected to experience a decline in the index of between 1 and 1.08 units, relative to country B.

**Table 4: Aid Dependence and Change in Bureaucratic Quality, 1984-2014, OLS estimates**

| Dependent Variable:<br>Δ Bureaucratic Quality, 1984-2014 | OLS<br>(1) | OLS<br>(2) | OLS<br>(3) | OLS<br>(4) | OLS<br>(5) |
|---|---|---|---|---|---|
| Initial Bureaucratic Quality | -1.01*** | -1.00*** | -1.06*** | -1.08*** | -1.00*** |
| | (0.12) | (0.11) | (0.11) | (0.12) | (0.10) |
| Mean Aid Dependence, 1984-2013 | -5.55*** | -5.11*** | -4.95*** | -4.65*** | -6.91*** |
| | (1.63) | (1.53) | (1.38) | (1.49) | (1.82) |
| Δ Relative GDP per capita, 1984-2013 | | 0.30* | 0.15 | 0.29* | 0.29* |
| | | (0.16) | (0.15) | (0.16) | (0.15) |
| Mean Ethnic Tensions, 1984-2013 | | | -0.27** | | |
| | | | (0.11) | | |
| Mean Domestic Violence, 1984-2013 | | | | -0.15** | |
| | | | | (0.07) | |
| Mean External Violence, 1984-2013 | | | | 0.17** | |
| | | | | (0.08) | |
| Oil Production Dummy, 1984-2013 | | | | | -0.38 |
| | | | | | (0.30) |
| Constant | 1.69*** | 1.52*** | 2.41*** | 1.72*** | 1.80*** |
| | (0.24) | (0.24) | (0.42) | (0.25) | (0.33) |
| Observations | 36 | 36 | 36 | 36 | 36 |
| $R^2$ | 0.70 | 0.73 | 0.76 | 0.76 | 0.74 |
| adj. $R^2$ | 0.68 | 0.70 | 0.73 | 0.71 | 0.70 |

*Notes:* Robust standard errors are shown in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level.

Overall, the coefficient on foreign dependence is always negative and highly statistically significant, suggesting that high degrees of dependence on international aid undermine the bureaucratic capacity of recipient countries. Our results are similar to the empirical findings presented by Bräutigam and Knack (2004). Moreover, those findings support the arguments by aid pessimists in general who argue that much of the foreign aid is wasted and contributes very little to developmental ends (Bauer, 1975; Easterly, 2006; Moyo, 2009).

We then subdivide the 30 year period into two sub-periods, namely 1984-1995 and 1996-2014. The reason why we split the time period into two is the following: The ending of the Cold War heralded the start of a new development paradigm among policymakers and international donor communities. From the mid-1990s onwards, greater attention was given to state capacity building in recipient countries emphasizing the important role of the state in development (Burnside &

Dollar, 2000; Dollar & Pritchett, 1998; World Bank, 1997). Up to the mid-1990s, the motivation for aid flows from donor to recipient countries had mainly been strategic and political: "an inefficient, economically closed, mismanaged non-democratic former colony politically friendly to its former colonizer, receives more foreign aid than another country with similar levels of poverty, a superior policy stance, but without a past as a colony" (Alesina & Dollar, 2000, p. 33). The collapse of communism and the end of the East-West divide triggered debates and discussions among policymakers and donor agencies about the role of development aid in reducing poverty, stimulating economic growth but also its potential role in promoting democratization in recipient countries. Van de Walle (2001) points out that "by the mid-1990s, aid was facing its most severe crisis, and the pressures for change were greater than ever before. Aid agencies were beginning to experiment with new approaches" (p. 233).

Table 5 reports the results for both sub-periods. Looking at the early period first, we observe that the coefficient for foreign aid dependence is always negative and highly statistically significant. Those results lend support to the view of the aid pessimists. The result remains unchanged after adding the same controls as in our previous analysis. We once again find a strong regression-to-the-mean effect. If we move to the period 1996-2014, we observe that the foreign aid dependence variable loses part of its explanatory power even though the coefficient remains negative in all cases.

Burnside and Dollar (2000) have argued for a policy-conditional effect of aid on growth, namely that the returns to aid are bigger in recipient countries with better institutions. The positive effects of the Marshall aid program after the Second World War, for example, are partly attributed to the well-functioning institutions in the Western European recipient countries (Behrman, 2007). We extend the Burnside-Dollar hypothesis by applying it to bureaucratic capacity rather than economic growth. In our modified Burnside-Dollar hypothesis, we test the hypothesis that foreign aid can improve bureaucratic capacity in a recipient country if the initial level of bureaucratic quality is higher. We therefore interact mean aid dependence with the initial bureaucratic quality level. We find some weak evidence for the modified Burnside-Dollar hypothesis, but only for the second sub-period (Table 6). Countries with better initial bureaucratic policies have less negative returns to aid due to the mitigating effect coming from having a high initial level of institutional capacity. The results for the full period and the early period can be found in Appendix 3. We will return to the modified Burnside-Dollar hypothesis in section 4.3.

**Table 5: Aid Dependence and Change in Bureaucratic Quality, 1984-1995 and 1996-2014, OLS estimates**

| | Time period 1984-1995 | | | | | Time period 1996-2014 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Dependent Variable: | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS |
| Δ Bureaucratic Quality | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Initial Bureaucratic Quality | -0.60*** | -0.64*** | -0.63*** | -0.64*** | -0.65*** | -0.75*** | -0.77*** | -0.80*** | -0.81*** | -0.74*** |
| | (0.12) | (0.13) | (0.13) | (0.13) | (0.13) | (0.14) | (0.14) | (0.15) | (0.17) | (0.14) |
| Mean Aid Dependence | -4.33*** | -4.48*** | -4.48*** | -4.43*** | -3.27** | -3.63** | -4.63 | -3.88 | -4.39 | -7.31** |
| | (1.30) | (1.11) | (1.13) | (1.18) | (1.43) | (1.71) | (2.94) | (2.63) | (2.78) | (3.41) |
| Δ Relative GDP per capita | | 0.81 | 0.82 | 0.77 | 0.95** | | 0.10 | 0.04 | 0.06 | 0.18 |
| | | (0.49) | (0.60) | (0.51) | (0.46) | | (0.16) | (0.13) | (0.14) | (0.15) |
| Mean Ethnic Tensions | | | 0.01 | | | | | -0.24** | | |
| | | | (0.14) | | | | | (0.09) | | |
| Mean Domestic Violence | | | | -0.05 | | | | | -0.15** | |
| | | | | (0.05) | | | | | (0.06) | |
| Mean External Violence | | | | 1.21 | | | | | 0.69 | |
| | | | | (1.21) | | | | | (0.52) | |
| Oil Production Dummy | | | | | 0.42 | | | | | -0.48* |
| | | | | | (0.32) | | | | | (0.24) |
| Constant | 1.37*** | 1.48*** | 1.45*** | 1.53*** | 1.26*** | 1.12*** | 1.15*** | 1.82*** | 1.32*** | 1.43*** |
| | (0.24) | (0.24) | (0.52) | (0.27) | (0.32) | (0.32) | (0.32) | (0.47) | (0.41) | (0.42) |
| Observations | 36 | 36 | 36 | 36 | 36 | 37 | 37 | 37 | 37 | 37 |
| $R^2$ | 0.46 | 0.51 | 0.51 | 0.51 | 0.53 | 0.50 | 0.50 | 0.58 | 0.57 | 0.54 |
| adj. $R^2$ | 0.43 | 0.46 | 0.44 | 0.43 | 0.47 | 0.47 | 0.46 | 0.52 | 0.50 | 0.49 |

*Notes:* Robust standard errors are shown in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level.

**Table 6: Aid Dependence, Precolonial Centralization and Change in Bureaucratic Quality controlling for initial conditions, 1996-2014, OLS estimates**

| Dependent Variable: | OLS | OLS | OLS | OLS | OLS |
|---|---|---|---|---|---|
| Δ Bureaucratic Quality, 1996-2014 | (1) | (2) | (3) | (4) | (5) |
| Initial Bureaucratic Quality | -0.85*** | -0.94*** | -0.96*** | -0.93*** | -0.89*** |
| | (0.15) | (0.16) | (0.16) | (0.19) | (0.14) |
| Mean Aid Dependence, 1996-2013 | -5.33*** | -8.70*** | -7.54** | -7.30** | -10.30*** |
| | (1.85) | (3.09) | (2.97) | (3.49) | (3.45) |
| Mean Aid Dependence, 1996-2013 | 2.58 | 4.07* | 3.62 | 2.82 | 3.36* |
| x Initial Bureaucratic Quality | (1.72) | (2.08) | (2.30) | (2.09) | (1.97) |
| Δ Relative GDP per capita, 1996-2013 | | 0.24 | 0.17 | 0.16 | 0.28* |
| | | (0.16) | (0.15) | (0.16) | (0.16) |
| Mean Ethnic Tensions, 1996-2013 | | | -0.23** | | |
| | | | (0.09) | | |
| Mean Domestic Violence, 1996-2013 | | | | -0.13** | |
| | | | | (0.06) | |
| Mean External Violence, 1996-2013 | | | | 0.52 | |
| | | | | (0.53) | |
| Oil Production Dummy, 1996-2013 | | | | | -0.42* |
| | | | | | (0.24) |
| Constant | 1.22*** | 1.36*** | 1.97*** | 1.46*** | 1.56*** |
| | (0.33) | (0.33) | (0.46) | (0.42) | (0.41) |
| Observations | 37 | 37 | 37 | 37 | 37 |
| $R^2$ | 0.51 | 0.54 | 0.60 | 0.58 | 0.57 |
| adj. $R^2$ | 0.47 | 0.48 | 0.54 | 0.50 | 0.50 |

*Notes:* Robust standard errors are shown in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level.

All in all, we find empirical support for both the aid pessimists and conditional optimists. On the one hand, large aid dependence undermines institutional capacity development. On the other hand, however, this effect is slightly offset by the positive effect of aid on bureaucratic quality in recipient countries with a sound institutional environment. Our results are therefore similar to previous findings in the aid-governance literature. Moreover, our analysis has reconciled the empirical findings by both aid pessimists and conditional optimists. In section 4.2, we will investigate the deep sources of contemporary state capacity on the African continent.

### 4.2. Deep Determinants of Differences in Contemporary Bureaucratic Capacity Levels

In Table 7 we report our OLS estimates for the deep determinants of contemporary state capacity in Africa. In our basic specification, column (1), precolonial centralization has an estimated positive impact on bureaucratic quality in 2014. The estimated coefficient on precolonial centralization implies, that a one standard deviation increase (s.d. = 0.77) in

precolonial centralization translates, on average, into an expected change in bureaucratic quality by 1.01 points. This impact is rather large considering that the bureaucratic quality index ranges from 0 to 4 only. This result is intriguing for yet another reason. The $R^2$ equals 0.29, implying that almost one-third of the variation in bureaucratic quality in 2014 can be explained by precolonial statehood, a phenomenon that dates back to the mid-late 19th century.

In the remaining odd-numbered columns, we control for other potential confounding factors. Even-numbered columns include a rich set of geographic factors. In column (3), we add the colonizer identity to the regressions. The non-colonized countries Ethiopia and Liberia serve as baseline group. The dummy for being a Belgian colony, which captures the DRC, is highly statistically significant and negative. With King Leopold II creating the Congo Free State in 1885 and colonizing the area as his private holding, the DRC serves as primary example of the extractive state (Hochschild, 1998; van Reybrouck, 2010). Moreover, our results in column (3) contrast with a common perception that the former British colonies significantly perform better if compared to former French colonies (La Porta et al., 1999). Our coefficient for precolonial centralization, however, is barely affected.[24] In column (5) we add several proximate sources of bureaucratic capacity such as foreign aid dependence. Even though all control variables have their expected sign, the coefficients are not statistically significant. In column (7), we control for British legal origin where French legal origin serves as baseline category. As the coefficient is not statistically significantly different from zero, we do not find empirical evidence that African countries with a civil law system have lower state capacity levels than do countries with a common law system. In column (9) and column (11), we control for initial population density in 1400 and artificial state characteristics proxied by our *partitioned* measure, respectively. Both coefficients are not statistically significant at all conventional significance levels and of little practical importance. More importantly, the addition of those control variables does not drastically change the estimated effect of precolonial centralization.

The results change very little even after controlling for geographic factors (columns 2, 4, 6, 8, 10 and 12). We conduct an F-test on all geographic controls to see if the coefficients on our geographic factors are jointly significant. In all regression estimations, the F-statistic is very low. We therefore fail to reject the null hypothesis of no significant effect of our geographic variables. At the same time, the coefficient for precolonial centralization even increases several times after controlling for geography. Overall, the results presented in Table 7 show a large and statistically significant effect of precolonial centralization on contemporary bureaucratic quality in Africa.

[24] When classifying Somalia as an Italian colony, our results do not change in any fundamental way.

The positive relationship between ancient statehood and contemporary state capacity, however, becomes less strong and less statistically significant the further we go back in time (Figure A4.1). This empirical finding has received no attention by Gennaioli and Rainer (2006).[25] Their results may suggest that the link between precolonial centralization and institutional quality has been persistent throughout the entire independence era. This is not the case, however, when it comes to bureaucratic capacity. Correlating ancient statehood with bureaucratic quality in 1986, for example, one can clearly observe that the positive relationship between precolonial centralization and state capacity is not yet visible. Our observations are confirmed by a regression analysis using bureaucratic quality in 1986 as dependent variable (Table 8).[26] The coefficients of all colonial dummies are, in turn, highly statistically significant. Our results suggest that the positive link between ancient statehood and contemporary state capacity in Africa has only started to become strong from the mid-1990s onwards.

Moreover, we observe a significant, negative relationship between precolonial centralization and foreign aid dependence for the entire period 1984-2014 and both sub-periods, 1984-1995 and 1996-2014 (Figure A4.2). All previous studies investigating the link between institutional capacity and foreign aid dependence in Africa, however, failed to control for precolonial centralization. We therefore have reason to believe that their regression results may suffer from endogeneity problems in the form of omitted variable bias. Based on the findings from the static analysis we will now return to the dynamic analysis this time controlling for precolonial centralization.

### 4.3. Aid Dependence, Precolonial Centralisation and Changes in Bureaucratic Capacity

In this section we will basically repeat the analysis from section 4.1, but we will now control for precolonial centralization. Controlling for precolonial centralization may be counterintuitive at first, since we are already controlling for the initial level of bureaucratic quality. The initial level of bureaucratic quality should help to account for idiosyncratic time-invariant initial conditions such as geographic location, cultural heritage, ethno-linguistic fractionalization, or precolonial centralization. However, we have found that the positive relationship between precolonial centralization and bureaucratic quality has become more pronounced over time. It is for this reason we control for precolonial centralization in our regression specification. In columns (1)-(10) in Table 9 we report our results for the full time period.

[25] In their study, Gennaioli and Rainer (2006) find a positive correlation between precolonial centralization and two proxies for institutional quality, (i) rule of law and (ii) control of corruption for the time period 1996-2004.

[26] Even though the Bureaucratic Quality index published by the PRS Group covers the time period 1984-2014, the index is only available from 1986 onwards for several African countries. As a consequence thereof, we use bureaucratic quality in 1986 as dependent variable to cover more African countries. Results are, however, similar for the year 1984 and can be found in Appendix 4.

## Table 7: Precolonial Centralization and State Capacity in 2014, OLS estimates

| Dependent Variable: Bureaucratic Quality, 2014 | OLS (1) | OLS (2) | OLS (3) | OLS (4) | OLS (5) | OLS (6) | OLS (7) | OLS (8) | OLS (9) | OLS (10) | OLS (11) | OLS (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Precolonial Centralization | 1.31*** | 1.30** | 1.26*** | 1.30** | 1.11** | 1.22* | 1.33*** | 1.37** | 1.32*** | 1.29** | 1.41*** | 1.64*** |
| | (0.32) | (0.53) | (0.36) | (0.56) | (0.45) | (0.67) | (0.34) | (0.53) | (0.33) | (0.54) | (0.36) | (0.55) |
| British | | | 0.52* | 0.73** | | | | | | | | |
| | | | (0.26) | (0.30) | | | | | | | | |
| French | | | 0.33 | 0.50** | | | | | | | | |
| | | | (0.25) | (0.23) | | | | | | | | |
| Belgian | | | -1.04*** | -0.96** | | | | | | | | |
| | | | (0.19) | (0.36) | | | | | | | | |
| Portuguese | | | 0.40 | 0.52 | | | | | | | | |
| | | | (0.38) | (0.40) | | | | | | | | |
| Mean GDP per Capita, 61-13 | | | | | 0.13 | 0.23 | | | | | | |
| | | | | | (0.15) | (0.20) | | | | | | |
| Mean Aid Dependence, 61-13 | | | | | -0.98 | -0.62 | | | | | | |
| | | | | | (1.21) | (1.52) | | | | | | |
| Mean Domestic Violence, 61-13 | | | | | -0.11 | -0.12 | | | | | | |
| | | | | | (0.07) | (0.10) | | | | | | |
| Mean External Violence, 61-13 | | | | | 0.91 | 0.71 | | | | | | |
| | | | | | (1.15) | (1.46) | | | | | | |
| Oil Production Dummy, 61-13 | | | | | -0.23 | -0.47 | | | | | | |
| | | | | | (0.28) | (0.51) | | | | | | |
| Legal Origin | | | | | | | 0.23 | 0.30 | | | | |
| | | | | | | | (0.22) | (0.27) | | | | |
| Population Density in 1400 | | | | | | | | | 0.06 | 0.01 | | |
| | | | | | | | | | (0.09) | (0.16) | | |
| Partitioned | | | | | | | | | | | 0.00 | 0.00 |
| | | | | | | | | | | | (0.00) | (0.00) |
| Constant | 0.56** | 0.70 | 0.22 | -0.03 | 0.05 | -0.69 | 0.45 | 0.50 | 0.42 | 0.70 | 0.47 | -0.12 |
| | (0.24) | (0.70) | (0.23) | (0.67) | (0.96) | (1.68) | (0.28) | (0.72) | (0.34) | (0.71) | (0.36) | (0.69) |
| Observations | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 32 | 32 |
| Geography controls | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| $R^2$ | 0.29 | 0.33 | 0.42 | 0.46 | 0.36 | 0.42 | 0.32 | 0.36 | 0.26 | 0.33 | 0.34 | 0.45 |
| adj. $R^2$ | 0.27 | 0.20 | 0.33 | 0.26 | 0.24 | 0.16 | 0.28 | 0.21 | 0.30 | 0.17 | 0.29 | 0.29 |

*Notes:* The variables *GDP per capita* and *Population Density* are log transformed. Robust standard errors are shown in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level. Geography controls are *Latitude*, *Log Mountainous Terrain*, *% of cultivated land in Köppen–Geiger climate zone A (humid climate with no winter)*, *% of cultivated land in Köppen–Geiger climate zone B (dry climate with no winter)* and *Mean distance to nearest coastline or sea-navigable river (km).*

## Table 8: Precolonial Centralization and State Capacity in 1986, OLS estimates

| Dependent Variable: Bureaucratic Quality, 1986 | OLS (1) | OLS (2) | OLS (3) | OLS (4) | OLS (5) | OLS (6) | OLS (7) | OLS (8) | OLS (9) | OLS (10) | OLS (11) | OLS (12) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Precolonial Centralization | 0.28 | -0.21 | 0.29 | -0.18 | -0.03 | -0.60 | 0.25 | -0.38 | 0.14 | -0.18 | 0.52 | 0.11 |
| | (0.65) | (0.83) | (0.60) | (0.89) | (0.58) | (0.85) | (0.68) | (0.81) | (0.66) | (0.84) | (0.64) | (0.93) |
| British | | | 1.44*** | 1.29*** | | | | | | | | |
| | | | (0.33) | (0.41) | | | | | | | | |
| French | | | 1.91*** | 2.08*** | | | | | | | | |
| | | | (0.32) | (0.41) | | | | | | | | |
| Belgian | | | 0.93*** | 2.10*** | | | | | | | | |
| | | | (0.17) | (0.73) | | | | | | | | |
| Portuguese | | | 1.63*** | 1.38*** | | | | | | | | |
| | | | (0.29) | (0.34) | | | | | | | | |
| Mean GDP per Capita, 61-86 | | | | | 0.65** | 0.20 | | | | | | |
| | | | | | (0.28) | (0.30) | | | | | | |
| Mean Aid Dependence, 61-86 | | | | | -1.04 | -2.16 | | | | | | |
| | | | | | (1.27) | (1.29) | | | | | | |
| Mean Domestic Violence, 61-86 | | | | | -0.10 | -0.14 | | | | | | |
| | | | | | (0.12) | (0.10) | | | | | | |
| Mean External Violence, 61-86 | | | | | 1.31 | -0.42 | | | | | | |
| | | | | | (0.86) | (1.21) | | | | | | |
| Oil Production, 61-86 | | | | | -0.70 | 0.52 | | | | | | |
| | | | | | (0.58) | (0.67) | | | | | | |
| Legal Origin | | | | | | | -0.31 | -0.66* | | | | |
| | | | | | | | (0.41) | (0.34) | | | | |
| Population Density in 1400 | | | | | | | | | -0.25 | -0.13 | | |
| | | | | | | | | | (0.18) | (0.20) | | |
| Partitioned | | | | | | | | | | | 0.00 | 0.00 |
| | | | | | | | | | | | (0.01) | (0.01) |
| Constant | 1.43*** | 2.63** | -0.12 | 1.07 | -2.23 | 1.75 | 1.57*** | 3.09*** | 1.61*** | 2.61** | 1.33** | 1.84 |
| | (0.41) | (1.20) | (0.27) | (0.99) | (1.83) | (2.49) | (0.49) | (1.04) | (0.45) | (1.19) | (0.52) | (1.39) |
| Observations | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 31 | 31 |
| Geography controls | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| $R^2$ | 0.01 | 0.23 | 0.17 | 0.44 | 0.23 | 0.44 | 0.03 | 0.30 | 0.05 | 0.23 | 0.03 | 0.26 |
| adj. $R^2$ | -0.02 | 0.07 | 0.04 | 0.22 | 0.07 | 0.18 | -0.03 | 0.13 | -0.01 | 0.04 | -0.04 | 0.04 |

*Notes:* The variables *GDP per capita* and *Population Density* are log transformed. Robust standard errors are shown in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level. Geography controls are *Latitude*, *Log Mountainous Terrain*, *% of cultivated land in Köppen–Geiger climate zone A (humid climate with no winter)*, *% of cultivated land in Köppen–Geiger climate zone B (dry climate with no winter)* and *Mean distance to nearest coastline or sea-navigable river (km)*.

**Table 9: Aid Dependence, Precolonial Centralization and Change in Bureaucratic Quality, 1984-2014, OLS estimates**

| Dependent Variable: | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS |
|---|---|---|---|---|---|---|---|---|---|---|
| Δ Bureaucratic Quality, 1984-2014 | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Initial Bureaucratic Quality | -1.01*** | -1.01*** | -1.00*** | -1.01*** | -1.06*** | -1.06*** | -1.08*** | -1.07*** | -1.00*** | -1.01*** |
| | (0.12) | (0.09) | (0.11) | (0.09) | (0.11) | (0.10) | (0.12) | (0.10) | (0.10) | (0.09) |
| Mean Aid Dependence, 1984-2013 | -5.55*** | -3.03* | -5.11*** | -3.10 | -4.95*** | -3.18* | -4.65*** | -2.81 | -6.91*** | -4.78* |
| | (1.63) | (1.74) | (1.53) | (1.91) | (1.38) | (1.71) | (1.49) | (1.73) | (1.82) | (2.35) |
| Precolonial Centralization | | 1.15*** | | 1.01** | | 0.90* | | 1.00** | | 0.99** |
| | | (0.38) | | (0.44) | | (0.45) | | (0.44) | | (0.43) |
| Δ Relative GDP per capita, 1984-2013 | | | 0.30* | 0.15 | 0.15 | 0.04 | 0.29* | 0.14 | 0.29* | 0.15 |
| | | | (0.16) | (0.17) | (0.15) | (0.14) | (0.16) | (0.16) | (0.15) | (0.15) |
| Mean Ethnic Tensions, 1984-2013 | | | | | -0.27** | -0.23* | | | | |
| | | | | | (0.11) | (0.12) | | | | |
| Mean Domestic Violence, 1984-2013 | | | | | | | -0.15** | -0.15** | | |
| | | | | | | | (0.07) | (0.07) | | |
| Mean External Violence, 1984-2013 | | | | | | | 0.17** | 0.07 | | |
| | | | | | | | (0.08) | (0.07) | | |
| Oil Production Dummy, 1984-2013 | | | | | | | | | -0.38 | -0.35 |
| | | | | | | | | | (0.30) | (0.30) |
| Constant | 1.69*** | 0.89** | 1.52*** | 0.90** | 2.41*** | 1.71*** | 1.72*** | 1.10*** | 1.80*** | 1.17** |
| | (0.24) | (0.36) | (0.24) | (0.38) | (0.42) | (0.56) | (0.25) | (0.38) | (0.33) | (0.45) |
| Observations | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 |
| $R^2$ | 0.70 | 0.77 | 0.73 | 0.77 | 0.76 | 0.79 | 0.76 | 0.80 | 0.74 | 0.78 |
| adj. $R^2$ | 0.68 | 0.74 | 0.70 | 0.74 | 0.73 | 0.76 | 0.71 | 0.75 | 0.70 | 0.75 |

*Notes:* Robust standard errors are shown in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level.

Odd-numbered columns report the effect of foreign aid on bureaucratic quality not controlling for precolonial centralization. Those are the estimation results already reported in Table 4 and will not be discussed in great length again. Even-numbered columns do control for precolonial centralization. Our results are very intriguing. First, the negative relationship between foreign aid dependence and bureaucratic quality becomes weaker. Second, the precolonial centralization variable enters positively and statistically significantly in our regression estimations. The effect remains robust after controlling for relative changes in GDP per capita, average ethnic tensions, average political violence and average oil production for the period under consideration. Increasing GDP per capita is associated with an improving bureaucratic quality, even though the effect is only statistically significant in some of the specifications. Not surprisingly, ethnic tensions and domestic politic violence are negatively linked to bureaucratic performance. Both effects are statistically significant. External violence contributes to state capacity building, even though the effect is no longer statistically significant after controlling for precolonial centralization. In a similar vein, the coefficient for oil production is not statistically significant. Moreover, we once again find a strong regression-to-the-mean effect. When controlling for precolonial centralization, the adjusted R squared increases in each regression specification suggesting an improved goodness of fit of our model. Overall, when controlling for precolonial centralization, the regression estimations presented in Table 9 can explain between 77 and 80 percent of the variation in changes of bureaucratic quality over time.

Table 10 repeats the same analysis for the time period 1984-1995. Odd-numbered columns reproduce previous results from Table 5 where we do not control for precolonial centralization. When controlling for precolonial centralization in the even-numbered columns, the coefficient on foreign aid dependence remains fairly stable and highly statistically significant in most cases. The coefficient on precolonial centralization, however, is not statistically significant and even changes signs after adding control variables to the regression model. We do not want to overemphasize the negative sign of the precolonial centralization coefficient. However, when controlling for precolonial centralization, there is stronger evidence for a negative effect of aid dependence on state capacity for the sub-period 1984-1995 in comparison with the entire thirty year period.

The next step is to look at the relationship between aid dependence and bureaucratic quality for the second sub-period (Table 11). We observe that without controlling for precolonial centralization the coefficient on foreign aid dependence is always negative but only statistically significant in two out of five cases. When controlling for precolonial centralization, the negative relationship between foreign aid dependence and bureaucratic quality weakens considerably and

**Table 10: Aid Dependence, Precolonial Centralization and Change in Bureaucratic Quality, 1984-1995, OLS estimates**

| Dependent Variable:<br>Δ Bureaucratic Quality, 1984-1995 | OLS<br>(1) | OLS<br>(2) | OLS<br>(3) | OLS<br>(4) | OLS<br>(5) | OLS<br>(6) | OLS<br>(7) | OLS<br>(8) | OLS<br>(9) | OLS<br>(10) |
|---|---|---|---|---|---|---|---|---|---|---|
| Initial Bureaucratic Quality | -0.60*** | -0.60*** | -0.64*** | -0.64*** | -0.63*** | -0.63*** | -0.64*** | -0.64*** | -0.65*** | -0.65*** |
| | (0.12) | (0.12) | (0.13) | (0.13) | (0.13) | (0.13) | (0.13) | (0.14) | (0.13) | (0.13) |
| Mean Aid Dependence, 1984-1995 | -4.33*** | -4.00** | -4.48*** | -4.61*** | -4.48*** | -4.61*** | -4.43*** | -4.49*** | -3.27** | -3.44* |
| | (1.30) | (1.61) | (1.11) | (1.55) | (1.13) | (1.57) | (1.18) | (1.63) | (1.43) | (1.78) |
| Precolonial Centralization | | 0.24 | | -0.09 | | -0.09 | | -0.04 | | -0.13 |
| | | (0.57) | | (0.59) | | (0.60) | | (0.60) | | (0.56) |
| Δ Relative GDP per capita, 1984-1995 | | | 0.81 | 0.85 | 0.82 | 0.87 | 0.77 | 0.79 | 0.95** | 1.01* |
| | | | (0.49) | (0.54) | (0.60) | (0.61) | (0.51) | (0.56) | (0.46) | (0.52) |
| Mean Ethnic Tensions, 1984-1995 | | | | | 0.01 | 0.01 | | | | |
| | | | | | (0.14) | (0.14) | | | | |
| Mean Domestic Violence, 1984-1995 | | | | | | | -0.05 | -0.04 | | |
| | | | | | | | (0.05) | (0.05) | | |
| Mean External Violence, 1984-1995 | | | | | | | 1.21 | 1.25 | | |
| | | | | | | | (1.21) | (1.11) | | |
| Oil Production Dummy, 1984-1995 | | | | | | | | | 0.42 | 0.43 |
| | | | | | | | | | (0.32) | (0.32) |
| Constant | 1.37*** | 1.21** | 1.48*** | 1.54*** | 1.45*** | 1.51* | 1.53*** | 1.56*** | 1.26*** | 1.35** |
| | (0.24) | (0.47) | (0.24) | (0.53) | (0.52) | (0.80) | (0.27) | (0.55) | (0.32) | (0.57) |
| Observations | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 |
| $R^2$ | 0.46 | 0.47 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | 0.53 | 0.54 |
| adj. $R^2$ | 0.43 | 0.42 | 0.46 | 0.44 | 0.44 | 0.43 | 0.43 | 0.41 | 0.47 | 0.46 |

*Notes:* Robust standard errors are shown in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level.

**Table 11: Aid Dependence, Precolonial Centralization and Change in Bureaucratic Quality, 1996-2014, OLS estimates**

| Dependent Variable:<br>Δ Bureaucratic Quality, 1996-2014 | OLS<br>(1) | OLS<br>(2) | OLS<br>(3) | OLS<br>(4) | OLS<br>(5) | OLS<br>(6) | OLS<br>(7) | OLS<br>(8) | OLS<br>(9) | OLS<br>(10) |
|---|---|---|---|---|---|---|---|---|---|---|
| Initial Bureaucratic Quality | -0.75*** | -0.75*** | -0.77*** | -0.76*** | -0.80*** | -0.79*** | -0.81*** | -0.80*** | -0.74*** | -0.73*** |
| | (0.14) | (0.12) | (0.14) | (0.13) | (0.15) | (0.14) | (0.17) | (0.15) | (0.14) | (0.13) |
| Mean Aid Dependence, 1996-2013 | -3.63** | -1.12 | -4.63 | -1.36 | -3.88 | -1.42 | -4.39 | -1.60 | -7.31** | -3.93 |
| | (1.71) | (2.11) | (2.94) | (3.24) | (2.63) | (3.15) | (2.78) | (3.11) | (3.41) | (3.77) |
| Precolonial Centralization | | 1.06** | | 1.05** | | 0.86** | | 0.95** | | 1.02** |
| | | (0.39) | | (0.41) | | (0.41) | | (0.42) | | (0.40) |
| Δ Relative GDP per capita, 1996-2013 | | | 0.10 | 0.02 | 0.04 | -0.01 | 0.06 | -0.00 | 0.18 | 0.10 |
| | | | (0.16) | (0.14) | (0.13) | (0.13) | (0.14) | (0.13) | (0.15) | (0.15) |
| Mean Ethnic Tensions, 1996-2013 | | | | | -0.24** | -0.17* | | | | |
| | | | | | (0.09) | (0.10) | | | | |
| Mean Domestic Violence, 1996-2013 | | | | | | | -0.15** | -0.13** | | |
| | | | | | | | (0.06) | (0.06) | | |
| Mean External Violence, 1996-2013 | | | | | | | 0.69 | 0.40 | | |
| | | | | | | | (0.52) | (0.53) | | |
| Oil Production Dummy, 1996-2013 | | | | | | | | | -0.48* | -0.45* |
| | | | | | | | | | (0.24) | (0.25) |
| Constant | 1.12*** | 0.39 | 1.15*** | 0.40 | 1.82*** | 1.02* | 1.32*** | 0.65 | 1.43*** | 0.68 |
| | (0.32) | (0.38) | (0.32) | (0.41) | (0.47) | (0.54) | (0.41) | (0.47) | (0.42) | (0.49) |
| Observations | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 |
| $R^2$ | 0.50 | 0.60 | 0.50 | 0.60 | 0.58 | 0.64 | 0.57 | 0.65 | 0.54 | 0.64 |
| adj. $R^2$ | 0.47 | 0.57 | 0.46 | 0.55 | 0.52 | 0.58 | 0.50 | 0.58 | 0.49 | 0.58 |

*Notes:* Robust standard errors are shown in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level.

is no longer statistically significant in any of the five specifications. In contrast, the odd-numbered columns document a fairly strong positive and statistically significant relationship between precolonial centralization and changes in bureaucratic quality. This implies that, on average, countries with highly centralized precolonial institutions improved their bureaucratic quality over the time period 1996-2014 by more than countries with highly decentralized precolonial political systems. That is, relative to "deeper" factors, aid appears less important than both aid optimists and pessimists would argue.

Furthermore, we no longer find any empirical support for the modified Burnside-Dollar hypothesis in the latter period when controlling for precolonial centralization (Table 12). At the same time, we once again find a strong positive relationship between precolonial centralization and improvements in bureaucratic quality.[29] Summarizing, we neither find support for the aid pessimists nor the conditional optimists when controlling for precolonial centralization. Instead, our results indicate that precolonial centralization "trumps" foreign aid dependence when trying to explain changes in bureaucratic quality on the African continent for the period 1996-2014.

In this section we have documented a strong link between precolonial centralization and bureaucratic quality. For both the entire period 1984-2014 and the latter period 1996-2014, the aid dependence variable loses most of its explanatory power when controlling for precolonial centralization. The positive relationship between precolonial centralization and changes bureaucratic quality survives additional controls for the periods 1984-2014 and 1996-2014. For the early period, however, the strong and positive link between the two variables is not visible. When controls are added, there is no significant relationship between precolonial centralization and changes in bureaucratic quality between 1984 and 1995.

One interpretation of these findings would be that with the arrival of colonialism on the African continent, new colonial institutions were superimposed on pre-existing precolonial institutions. In the early years of independence, the colonial institutions had a strong influence on bureaucratic institutions and capabilities. As years passed, the temporary colonial influences faded and precolonial institutions reasserted their importance and increasingly shaped bureaucratic quality. Our results provide further empirical evidence for the importance of precolonial centralization in shaping contemporary state capacity in Africa. Our quantitative findings, however, only partially lend support for the historical continuity of indigenous political institutions in Africa (Gennaioli & Rainer, 2006).

[29] The results for the full period and early period are presented in Appendix 3.

**Table 12: Aid Dependence, Precolonial Centralization and Change in Bureaucratic Quality controlling for initial conditions, 1996-2014, OLS estimates**

| Dependent Variable: | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS |
|---|---|---|---|---|---|---|---|---|---|---|
| Δ Bureaucratic Quality, 1996-2014 | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Initial Bureaucratic Quality | -0.85*** | -0.78*** | -0.94*** | -0.81*** | -0.96*** | -0.85*** | -0.93*** | -0.80*** | -0.89*** | -0.75*** |
| | (0.15) | (0.12) | (0.16) | (0.14) | (0.16) | (0.15) | (0.19) | (0.16) | (0.14) | (0.14) |
| Mean Aid Dependence, 1996-2013 | -5.33*** | -1.60 | -8.70*** | -2.74 | -7.54** | -3.18 | -7.30** | -1.68 | -10.30*** | -4.26 |
| | (1.85) | (1.88) | (3.09) | (3.95) | (2.97) | (3.87) | (3.49) | (3.91) | (3.45) | (4.15) |
| Mean Aid Dependence, 1996-2013 | 2.58 | 0.61 | 4.07* | 1.13 | 3.62 | 1.45 | 2.82 | 0.07 | 3.36* | 0.30 |
| x Initial Bureaucratic Quality | (1.72) | (1.86) | (2.08) | (2.30) | (2.30) | (2.40) | (2.09) | (2.28) | (1.97) | (2.26) |
| Precolonial Centralization | | 1.03** | | 0.97** | | 0.75 | | 0.94** | | 1.00** |
| | | (0.40) | | (0.46) | | (0.46) | | (0.46) | | (0.44) |
| Δ Relative GDP per capita, 1996-2013 | | | 0.24 | 0.07 | 0.17 | 0.05 | 0.16 | 0.00 | 0.28* | 0.11 |
| | | | (0.16) | (0.17) | (0.15) | (0.16) | (0.16) | (0.16) | (0.16) | (0.17) |
| Mean Ethnic Tensions, 1996-2013 | | | | | -0.23** | -0.17* | | | | |
| | | | | | (0.09) | (0.10) | | | | |
| Mean Domestic Violence, 1996-2013 | | | | | | | -0.13** | -0.13* | | |
| | | | | | | | (0.06) | (0.07) | | |
| Mean External Violence, 1996-2013 | | | | | | | 0.52 | 0.40 | | |
| | | | | | | | (0.53) | (0.55) | | |
| Oil Production Dummy, 1996-2013 | | | | | | | | | -0.42* | -0.44 |
| | | | | | | | | | (0.24) | (0.27) |
| Constant | 1.22*** | 0.43 | 1.36*** | 0.51 | 1.97*** | 1.18* | 1.46*** | 0.65 | 1.56*** | 0.71 |
| | (0.33) | (0.38) | (0.33) | (0.46) | (0.46) | (0.59) | (0.42) | (0.51) | (0.41) | (0.50) |
| Observations | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 |
| $R^2$ | 0.51 | 0.60 | 0.54 | 0.61 | 0.60 | 0.64 | 0.58 | 0.65 | 0.57 | 0.64 |
| adj. $R^2$ | 0.47 | 0.55 | 0.48 | 0.54 | 0.54 | 0.57 | 0.50 | 0.56 | 0.50 | 0.57 |

*Notes:* Robust standard errors are shown in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level.

## 5. ROBUSTNESS

This section presents some additional robustness checks. Section 5.1 addresses potential endogeneity problems with regard to our static analysis. Section 5.2 tackles endogeneity concerns with regard to our dynamic analysis.

### 5.1. 2SLS Estimates for Static Analysis

Our previous OLS estimates may suffer from endogeneity bias. First, the positive relationship between precolonial centralization and bureaucratic quality might be driven by omitted variable bias. Time-variant non-observable factors may have driven both precolonial state formation and contemporary state capacity, potentially producing misleading cross-country estimates. Second, Murdock's (1967) classification of precolonial centralization as proxy for the level of ancient statehood is subject to the critique that it may contain sizeable measurement error (Michalopoulos & Papaioannou, 2015). In order to overcome the endogeneity problems, we instrument precolonial centralization with the TseTse fly suitability index (TSI) developed by Alsan (2015). In her empirical study, Alsan constructs the TSI at the regional level for 522 mainland-associated ethnic groups. She argues that ethnic groups inhabiting TseTse suitable areas were less likely to be politically centralized at the regional level. The detrimental impact of the TseTse fly on precolonial centralization goes through subsistence patterns "which influence settlement structure, population density, occupational specialization, and fiscal capacity, as well as […] transportation costs" (Alsan, 2015, p. 389).[30]

In order to construct a TSI index at the national level, we use land area of ethnic groups as weight. Data on land area at the sub-regional level comes from Fenske (2014). We therefore join Alsan's ethnic groups with Fenske's land area data. Unfortunately, land area is not available for each mainland-associated ethnic group. This leaves us with 467 ethnic groups for which we have data on both the TSI and land area. We then sort the 467 mainland-associated ethnic groups according to country. Since the dataset only includes mainland-associated ethnic groups, we have no data for the islands of Africa, e.g. Cape Verde, Comoros, Madagascar, Mauritius, Sao Tomé and Principe and Seychelles. Moreover, there are no observations for the mainland countries of Djibouti, Gambia and Lesotho. Our data show huge variations in terms of ethnic groups per country. While we have 60 observations for Nigeria (Igbo, Yoruba, Woodabe, Kanuri, among

[30] As previously discussed, low population density and high transportation costs are commonly viewed as two major obstades to state formation in Africa (Bates, 2001; Herbst, 2000). According to Alsan, those two variables are particularly affected by the TseTse, as "(…) low population densities, in general, are favored if communicable disease (e.g., sleeping sickness) is highly prevalent since it reduces the probability of pathogen transmission. Transport costs would have been affected by the TseTse since sending messages, carrying goods or military transport over land would have been hampered by the lack of large domesticated animals" (Alsan, 2015, p. 388-389).

others), we have only two observations for Somalia (Somali, Bajun), and only one observation for Swaziland (Swazi). We then calculate the national TSI for each country. The following example for Somalia aims to clarify our methodology. The TSI and land area for the Somali people, the largest ethnic group in Somalia, are equal to 0.490 and 58.902, respectively. The TSI and land area for the Bajun people, an ethnic minority group, are equal to 0.370 and 0.697. The total land area therefore equals 59.599. The TSI for the Somali people receives a weight of 0.9883 (58.902/59.599), while the TSI for the Bajun people get assigned a weight of only 0.0117 (0.697/59.5999). The national TSI for Somalia is equal to 0.4903208*0.9883 + 0.3703742*0.0117 = 0.489. The TSI indicators for all 44 African countries are documented in Table A2.3.

For the TSI to be a valid instrument, it must meet two conditions. First, the TSI must meet the instrument relevance condition. Variation in the TSI is related to variation in precolonial centralization. Moreover, our instrument must meet the instrument exogeneity condition. If the TSI is exogenous, it must be uncorrelated with the error term $u_i$. Or put differently, we must rule out any direct effect of the instrument on the dependent variable or any effect running through omitted variables (Angrist, Imbens, & Rubin, 1996).

Table 13 reports the 2SLS estimates of the precolonial centralization coefficient. The first stage regressions results are excluded due to limited space but are available upon request. Column (1) shows the strong relationship between precolonial centralization and bureaucratic quality in 2014 for our base specification. The corresponding 2SLS estimate of the impact of precolonial centralization on bureaucratic quality is 1.74. The coefficient remains highly statistically significant and is in fact larger than the OLS estimate reported in Table 7. This may therefore suggest that the coefficient of precolonial centralization in the uninstrumented regression in the first column of Table 7 suffered from attenuation bias (Wooldridge, 2002). The attenuation bias resulting from measurement error in the precolonial centralization variable would therefore be more important than omitted variable bias.[31] Column (2) shows that controlling for colonizer identity does not change the strong positive relationship. In a similar way, the positive link between precolonial statehood and contemporary state capacity remains intact after controlling for proximate determinants of contemporary state capacity (column 3), legal origin (column 4), population density in 1400 (column 5) and artificial state characteristics (column 6). Overall, the 2SLS estimates always remain (highly) statistically significant and are always larger than the coefficients from our OLS estimates in Table 7. Additional 2SLS results using alternative control variables can be found in Appendix 3.

[31] Endogeneity problems due to simultaneity bias/reverse causality are obviously of little concern here.

**Table 13: Precolonial Centralization and State Capacity in 2014, 2SLS estimates**

| Dependent Variable: Bureaucratic Quality, 2014 | 2SLS (1) | 2SLS (2) | 2SLS (3) | 2SLS (4) | 2SLS (5) | 2SLS (6) |
|---|---|---|---|---|---|---|
| Precolonial Centralization | 1.74*** | 1.45*** | 1.46** | 1.68*** | 1.76*** | 1.50*** |
| | (0.62) | (0.56) | (0.72) | (0.60) | (0.65) | (0.58) |
| British | | 0.43* | | | | |
| | | (0.22) | | | | |
| French | | 0.33 | | | | |
| | | (0.23) | | | | |
| Belgian | | -1.08*** | | | | |
| | | (0.16) | | | | |
| Portuguese | | 0.38 | | | | |
| | | (0.36) | | | | |
| Mean GDP per Capita, 61-13 | | | 0.10 | | | |
| | | | (0.14) | | | |
| Mean Aid Dependence, 61-13 | | | -0.83 | | | |
| | | | (1.39) | | | |
| Mean Domestic Violence, 61-13 | | | -0.11 | | | |
| | | | (0.07) | | | |
| Mean External Violence, 61-13 | | | 0.44 | | | |
| | | | (1.27) | | | |
| Oil Production Dummy, 61-13 | | | -0.19 | | | |
| | | | (0.26) | | | |
| Legal Origin | | | | 0.18 | | |
| | | | | (0.22) | | |
| Population Density in 1400 | | | | | 0.04 | |
| | | | | | (0.10) | |
| Partitioned | | | | | | 0.00 |
| | | | | | | (0.00) |
| Constant | 0.30 | 0.14 | 0.03 | 0.25 | 0.27 | 0.41 |
| | (0.42) | (0.26) | (0.95) | (0.45) | (0.44) | (0.46) |
| Observations | 35 | 35 | 35 | 35 | 35 | 31 |
| $R^2$, second stage | 0.29 | 0.43 | 0.37 | 0.31 | 0.29 | 0.38 |
| adj. $R^2$, second stage | 0.27 | 0.33 | 0.24 | 0.27 | 0.24 | 0.33 |
| *F*-statistic, first stage | 14.30 | 12.06 | 7.28 | 13.68 | 11.88 | 13.74 |
| Wooldridge's heteroskedasticity-robust score test (p-value in brackets) | .435 (0.510) | .071 (0.790) | .258 (0.611) | .368 (0.544) | .435 (0.510) | .015 (0.903) |

*Notes:* The variables *GDP per capita* and *Population Density* are log transformed. Robust standard errors are shown in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level. The instrument for precolonial centralization is the "national" TSI which is constructed by the authors.

In all but one case, the instrument we rely on is strong, since our first-stage F-statistics exceed the rule-of-thumb threshold of 10 (Staiger & Stock, 1997; Stock & Watson, 2012). We cannot answer the question whether our instrument meets the exogeneity condition. As our regression coefficients are exactly identified, we cannot deploy a test of overidentifying restrictions. We can,

however, test whether or not precolonial centralization or one of the other explanatory variables are highly endogenous. The most commonly used test is the Hausman test (Hausman, 1978). Since the Hausman test assumes homoskedasticity of the residuals, we used Wooldridge's (1995) heteroskedasticty-robust score test instead. The test score and the associated p-value are reported in Table 13 as well. In all six cases, Wooldridge's score test fails to reject reject the null hypothesis that our variable precolonial centralization is exogenous at all conventional significance levels.[32] If the endogenous regressor is in fact exogenous, then the OLS estimator is more efficient. Based on this analysis, we will treat precolonial centralization as exogenous for the rest of the analysis.

Summarizing, similar to Michalopoulos and Papaioannou (2015) who look at the relationship between precolonial centralization and contemporary development at the regional level, we document a strengthening of the association between precolonial centralization and contemporary state capacity at the national level after accounting for the potential endogeneity of precolonial centralization. Our econometric analysis, however, shows that our concerns with endogeneity are to a large extent unwarranted. Empirical regularities by previous studies both at the national and sub-national level (Gennaioli & Rainer, 2006, 2007; Michalopoulos & Papaioannou, 2013) should therefore remain intact.

### 5.2. 2SLS Estimates for Dynamic Analysis

In this section we address the endogeneity problem between foreign aid dependence and changes in bureaucratic quality. On the one hand, more aid could flow to countries with conditions impeding institutional change, as there is no evidence that less corrupt government or less authoritarian regimes receive more aid (Alesina & Dollar, 2000; Alesina & Weder, 2002). On the other hand, foreign aid may predominantly flow to countries whose bureaucratic capacity is improving as the return of aid is biggest in a sound institutional environment (Burnside & Dollar, 1997, 2000). In order to correct for potential reverse causality, we need to instrument for foreign aid dependence.

One of our instruments is population size. Population size captures the strategic interests of donor countries, as "there is an exogenous small country bias in aid such that smaller countries get higher aid per capita and higher aid as ratio to their income" (Easterly, 2009, p. 388). Moreover, Knack and Rahman (2007) show that the relationship between population size and bureaucratic quality is both theoretically and empirically weak. This suggests that our first

[32] Assuming homoskedasticity, we deploy the Durbin and Wu–Hausman tests as well for all six regression specifications in Table 10. Both tests arrive at the same conclusion that precolonial centralization can be treated as exogenous. The results are available upon request.

instrument may satisfy the relevance and exogeneity condition. Our second instrument is the initial development level, proxied by GDP per capita (log transformed). This instrument captures needs-based preferences and altruistic motives of aid. Generally, more development assistance goes to poor countries (Riddell, 2007). The exogeneity assumption is valid if we assume that low-income African aid recipients are not directly more vulnerable to institutional deterioration than their high-income counterparts. Both the population data and the GDP per capita data come from Maddison (2010) and from the World Development Indicators.

Ideally, we would like to use the initial population size and the initial development level for the period under consideration as instruments. We find, however, that population size at the beginning of the decade of the period under consideration is a much stronger instrument for aid dependence than initial population size. This result is perhaps surprising and we do not have an intuitive explanation for it. We therefore use the initial development level and population size at the beginning of the decade of the period under consideration as instruments for aid dependence. Since the two variables are uncorrelated among themselves, any linear combination is valid as well.[33] Using a linear combination of the two also allows us to deploy the test of overidentifying restrictions, which tests whether our instruments are purely exogenous. As mentioned before, we will not instrument for precolonial centralization, as we think this variable can be considered exogenous.[34]

Table 14 presents our 2SLS estimates for the dynamic analysis covering the full period. In the base specification (column 1), the coefficient on aid dependence is negative but not statistically significant. In contrast, however, and similar to our OLS estimates, the coefficient on precolonial centralization is positive and statistically significant. Our empirical results remain intact after controlling for change in GDP per capita (column 2), ethnic tensions (column 3), domestic and external violence (column 4) and oil wealth (column 5). The coefficients on both ethnic tension and domestic violence are statistically significant, confirming previous theoretical and empirical

[33] The correlation between log GDP per capita in 1984 and population in 1980 is -0.0723 and is not statistically significant at all conventional significance levels. In a similar way, the correlation between log GDP per capita in 1996 and population in 1990 is -0.0977 and not statistically significant at all conventional significance levels.

[34] While we believe that these instrumental variables are reasonable in the context of regressions where bureaucratic capacity is the outcome variable, we cannot fully guarantee the validity of our instruments, and we wish to emphasize that we think of the estimates in this section primarily as checks on the robustness of the OLS estimates. We considered novel instruments for foreign aid, along the lines of Dreher, Eichenauer and Gehring (2013), Galiani, Knack, Xu and Zou (2014) as well as Nunn and Qian (2014), but we did not find them suitable for the following reasons: First, the aforementioned authors instrument for foreign aid over time intervals of shorter lengths than used here, and their instrumental variables are better suited for regressons based on such (shorter) time-spans. More specifically, their studies use panel data with time periods between one and four years, while we work with significantly longer time-spans. Second, the contributions by Dreher et al. (2013) and Galiani et al. (2014) in particular investigate the effect of foreign aid on economic growth, while the study by Nunn and Qian (2014) examines the relationship between food aid from the United States exclusively and conflict in the recipient country. Our paper, however, discusses the impact of foreign aid on bureaucratic capacity, a fundamentally different concept.

work on the origins of contemporary state capacity and institutional quality (Alesina et al., 2003; Besley & Persson, 2008, 2011). The relationship between changes in bureaucratic quality and (i) external violence as well as (ii) oil wealth remains weak. Similar to our OLS estimates, the coefficient on initial bureaucratic quality is negative and highly statistically significant capturing a regression-to-the-mean effect. Countries that initially score either very high or very low on the bureaucratic quality index move, on average, closer to the mean.

In four out of five cases, the instruments we rely on appear to be valid. The first stage F-statistics are always above the critical rule-of-thumb threshold of 10, except in column (5). Moreover, our instruments appear to satisfy the exogeneity assumption as can be interpreted from the high p values for the Hansen's J-test of overidentification. In all cases, we fail to reject the null hypothesis that our two instruments are exogenous.

**Table 14: Aid Dependence, Precolonial Centralization and Change in Bureaucratic Quality, 1984-2014, 2SLS estimates**

| Dependent Variable:<br>Δ Bureaucratic Quality, 1984-2014 | 2SLS<br>(1) | 2SLS<br>(2) | 2SLS<br>(3) | 2SLS<br>(4) | 2SLS<br>(5) |
|---|---|---|---|---|---|
| Initial Bureaucratic Quality | -1.00*** | -1.00*** | -1.04*** | -1.06*** | -1.02*** |
| | (0.09) | (0.08) | (0.08) | (0.09) | (0.08) |
| Mean Aid Dependence, 1984-2013 | -1.29 | -2.08 | -1.36 | -1.87 | -5.43 |
| | (2.92) | (3.03) | (2.49) | (2.33) | (5.50) |
| Precolonial Centralization | 1.28*** | 1.09** | 1.07** | 1.19*** | 1.08** |
| | (0.44) | (0.48) | (0.43) | (0.38) | (0.51) |
| Δ Relative GDP per capita, 1984-2013 | | 0.15 | | | |
| | | (0.16) | | | |
| Mean Ethnic Tensions, 1984-2013 | | | -0.23** | | |
| | | | (0.11) | | |
| Mean Domestic Violence, 1984-2013 | | | | -0.15** | |
| | | | | (0.07) | |
| Mean External Violence, 1984-2013 | | | | 0.05 | |
| | | | | (0.06) | |
| Oil Production Dummy, 1984-2013 | | | | | -0.40 |
| | | | | | (0.44) |
| Constant | 0.68 | 0.78* | 1.52*** | 0.99*** | 1.26 |
| | (0.45) | (0.45) | (0.56) | (0.36) | (0.79) |
| Observations | 36 | 36 | 36 | 36 | 36 |
| $R^2$, second stage | 0.76 | 0.77 | 0.79 | 0.79 | 0.78 |
| adj. $R^2$, second stage | 0.74 | 0.74 | 0.76 | 0.76 | 0.75 |
| *F* statistic, first stage | 14.57 | 19.79 | 11.69 | 11.45 | 3.28 |
| Overidentifying restrictions, | 1.271 | 1.760 | 0.122 | 0.504 | 2.010 |
| *J*-test and *p*-value | (0.259) | (0.185) | (0.727) | (0.478) | (0.156) |

*Notes:* Robust standard errors in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level. Instruments in 2SLS for the period 1984-2014 and 1984-1995 indude population in 1980 and initial log GDP per capita. Instruments in 2SLS for the period 1996-2014 indude population in 1990 and initial log GDP per capita.

We now interpret the results for the two sub-periods (Table 15). While the aid coefficient is strongly negative and highly statistically significant in the early period, the effect of foreign aid on bureaucratic capacity remains ambiguous for the later period. Moreover, the negative effect of foreign aid on bureaucratic quality for the period 1984-1995 is now a lot stronger if compared to our OLS estimates in Table 10. Our intriguing finding on the relationship between precolonial centralization and the change in state capacity for the two-sub periods is similar to our OLS estimates in Table 10 and Table 11. While the link between the two variables is ambiguous for the early sub-period, the relationship is fairly strong and highly statistically significant for the 1996-2014 period. Our main findings change very little after including other control variables. The first stage F-statistics are more often than not above the critical rule-of-thumb threshold of 10, except in column (4) and column (5). Interestingly, our two instruments are somewhat weaker for the early sub-period if compared to the entire period and late sub-period. In all cases, we once again fail to reject the null hypothesis that our two instruments are exogenous.

With regard to foreign aid dependence, our 2SLS results suggest that foreign aid was damaging to bureaucratic capacity in the period 1984-1995 but not necessarily in the period 1996-2014, even after controlling for precolonial centralization. With regard to our positive precolonial centralization coefficient for the period 1996-2014, our tentative interpretation goes as follows. From the early and mid-1990s onwards, precolonial institutional characteristics exert an increasing influence on present bureaucratic capacity in a majority of African countries. While a majority of African countries officially gained independence in the 1960s, most of them were still profoundly vulnerable to external political and economic pressures during the entire postcolonial era (Meredith, 2005). In fact, a bulk of African countries found themselves struggling for true independence until the early 1990s. Worsening economic conditions, political crises, macroeconomic instability and the emerging debt crisis engulfed the majority of African countries in the 1980s. When the democratic wave swept across Africa in the 1990s as a result of the fall of communist regimes and the cessation of the Cold War, a majority of African countries slowly witnessed more varieties of freedom – press freedom, freedom of speech, freedom of movement and freedom of organization. It was during that period, when domestic institutional capacity was increasingly determined by precolonial levels of political centralisation. On average, countries with high precolonial political centralization witnessed an improvement in bureaucratic quality, while countries with highly fragmented precolonial political systems suffered from a decline in administrative capacity. Overall, our results highlight the historical legacy of the *precolonial* bureaucratic state in Africa.

**Table 15: Aid Dependence, Precolonial Centralization and Change in Bureaucratic Quality, 2SLS estimates**

| Dependent Variable: Δ Bureaucratic Quality | 2SLS 1984-1995 | | | | | 2SLS 1996-2014 | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Initial Bureaucratic Quality | -0.63*** | -0.68*** | -0.64*** | -0.64*** | -0.63*** | -0.68*** | -0.67*** | -0.68*** | -0.76*** | -0.70*** |
| | (0.11) | (0.12) | (0.12) | (0.12) | (0.12) | (0.13) | (0.14) | (0.14) | (0.14) | (0.14) |
| Mean Aid Dependence | -8.23** | -10.04*** | -8.16** | -8.40** | -10.44* | 1.36 | 2.19 | 2.12 | -0.28 | -1.93 |
| | (3.31) | (3.23) | (3.31) | (3.49) | (5.67) | (3.30) | (4.17) | (3.40) | (3.07) | (3.83) |
| Precolonial Centralization | -0.12 | -0.68 | -0.18 | -0.12 | -0.26 | 1.19*** | 1.21*** | 1.06*** | 1.02** | 1.09*** |
| | (0.58) | (0.57) | (0.60) | (0.59) | (0.77) | (0.40) | (0.42) | (0.40) | (0.40) | (0.39) |
| Δ Relative GDP per capita | | 1.21** | | | | | -0.09 | | | |
| | | (0.57) | | | | | (0.16) | | | |
| Mean Ethnic Tensions | | | -0.10 | | | | | -0.16* | | |
| | | | (0.12) | | | | | (0.09) | | |
| Mean Domestic Violence | | | | -0.05 | | | | | -0.13** | |
| | | | | (0.07) | | | | | (0.06) | |
| Mean External Violence | | | | 1.35 | | | | | 0.40 | |
| | | | | (1.24) | | | | | (0.49) | |
| Oil Production Dummy | | | | | -0.26 | | | | | -0.38 |
| | | | | | (0.40) | | | | | (0.25) |
| Constant | 1.79*** | 2.39*** | 2.13*** | 1.86*** | 2.14** | 0.06 | 0.02 | 0.50 | 0.47 | 0.50 |
| | (0.55) | (0.57) | (0.77) | (0.60) | (1.00) | (0.47) | (0.48) | (0.59) | (0.46) | (0.56) |
| Observations | 36 | 36 | 36 | 36 | 36 | 37 | 37 | 37 | 37 | 37 |
| $R^2$, second stage | 0.38 | 0.36 | 0.39 | 0.38 | 0.27 | 0.59 | 0.59 | 0.61 | 0.64 | 0.63 |
| adj. $R^2$, second stage | 0.32 | 0.28 | 0.31 | 0.27 | 0.17 | 0.55 | 0.53 | 0.56 | 0.59 | 0.59 |
| $F$ statistic, first stage | 10.29 | 11.44 | 10.07 | 9.44 | 4.73 | 16.87 | 19.83 | 17.06 | 15.93 | 11.05 |
| Overidentifying restrictions, | 0.266 | 0.058 | 0.800 | 0.707 | 0.168 | 0.366 | 0.133 | 0.118 | 0.059 | 0.064 |
| $J$-test and $p$-value | (0.606) | (0.809) | (0.371) | (0.401) | (0.682) | (0.545) | (0.715) | (0.731) | (0.808) | (0.800) |

*Notes:* Robust standard errors in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level. Instruments in 2SLS for the period 1984-1995 indude population in 1980 and initial log GDP per capita. Instruments in 2SLS for the period 1996-2014 indude population in 1990 and initial log GDP per capita.

## 6. CONCLUDING REMARKS

In this paper we have empirically examined the ultimate and proximate determinants of contemporary state capacity in Africa. We set out to investigate the relationship between foreign aid and state capacity. Our initial results suggested that foreign aid may have a negative impact on bureaucratic capacity, with a mitigating effect coming from having a high initial level of capacity. While not fully comparable to previous studies on the effects of foreign aid - as our focus is on a different outcome (bureaucratic capacity rather than broader institutional measures or economic growth) - these initial results weakly resemble those of scholars such as Burnside and Dollar (1997, 2000). However, upon further exploration of deeper determinants of bureaucratic capacity, we have found that postcolonial experiences strongly predict the level of capacity of current-day states. Furthermore, the inclusion of precolonial centralization in our econometric analysis removes the estimated impact of foreign aid on the evolution of bureaucratic capacity in recent years. Hence, our results suggest that previous studies examining the link between aid and institutional quality in Africa may have suffered from omitted variables bias by not including measures of precolonial experience.

Our work is closely related to a set of papers that find historical continuity of indigenous political institutions in Africa (Gennaioli & Rainer, 2006). However, in contrast to previous studies, we find that the strong link between precolonial centralization and modern bureaucratic capacity in Africa has only emerged from the mid-1990s onwards. In many African countries, colonial institutions were superimposed upon deeper institutional foundations. The postcolonial institutions resulting from colonial state legacies were often incongruent with precolonial systems. As the colonial period is slowly fading, the influence of precolonial political institutions on modern state capacity is reasserting itself. Consequently, our results provide further evidence for the importance of precolonial centralization in our understanding of present day economic and political developments on the continent (Gennaioli & Rainer, 2007; Michalopoulos & Papaioannou, 2013, 2014, 2015; Osafo-Kwaako & Robinson, 2013).

Our quantitative empirical work calls for further research, both theoretical and empirical. While it appears clear from our findings that contemporary institutional development on the African continent has deep historical roots, the channels through which these roots shape modern states are less clear. A rich understanding of these channels is going to require a combination of quantitative and qualitative analysis, ideally accompanied by theory-development. In particular, we believe that future fieldwork and case studies will paint a more complete picture of the trajectory of institutional development and state capacity in Africa from precolonial times until today.

# APPENDIX 1: DATA AND SOURCES

*Dependent variable*

| | |
|---|---|
| Bureaucratic Quality | The quality of the bureaucracy is a proxy for institutional strength. Bureaucratic Quality tends to minimize revisions of policy when governments change. Therefore, high points are given to countries where the bureaucracy has the strength and expertise to govern without drastic changes in policy or interruptions in government services. In these low-risk countries, the bureaucracy tends to be somewhat autonomous from political pressure and tends to have an established mechanism for recruitment and training. Countries that lack the cushioning effect of a strong bureaucracy receive low points because a change in government tends to be traumatic in terms of policy formulation and day-to-day administrative functions. Scale is 0-4.<br>Source: ICRG Index from PRS Group |

*Main explanatory variables*

| | |
|---|---|
| Aid Dependence | Annual total DAC-ODA Net Disbursements in current dollars. Western aid flows indude net disbursements from DAC donors only. Gross Domestic Product is expressed in current dollars.<br>Source: OECD/DAC database (2014) for Western aid flows in current dollars. World Development Indicators from World Bank (2014) for GDP data in current dollars. |
| Precolonial Centralization | For each country, the index measures the share of the non-European population that belongs to indigenously "centralized" ethnic groups. Scale is 0-1. An ethnic group is defined as "centralized" if it has 2, 3, or 4 jurisdictional levels above the local community according to Murdock's Jurisdictional Hierarchy variable. It is defined as "fragmented" if it has 0 or 1 levels.<br>Source: Constructed by Gennaioli and Rainer (2007) using Murdock (1967) and Atlas Narodov Mira (Bruk & Apenchenko, 1964). |

*Control variables*

<u>Historical determinants</u>

| | |
|---|---|
| British | Dummy variable that takes on the value of 1 if the country was a former British colony. |
| French | Dummy variable that takes on the value of 1 if the country was a former French colony. |
| Belgian | Dummy variable that takes on the value of 1 if the country was a former Belgian colony. |
| Portuguese | Dummy variable that takes on the value of 1 if the country was a former Portuguese colony. |

| | |
|---|---|
| Slave Exports - (area) or (population) | a) Number of slave exports normalized by size, measured by land area in square kilometers.<br>b) Number of slave exports normalized by size, measured by average population between 1400 and 1900.<br>No slave exports are recorded for Botswana, Cape Verde, Comoros, Lesotho, Mauritius, Morocco, Rwanda, Sao Tomé and Principe, Swaziland, Seychelles and Tunisia. Because the natural logarithm of zero is undefined, the natural logarithm of 0.1 is taken for zero-export countries.<br>Source: Nunn (2008). http://scholar.harvard.edu/nunn/pages/data-0 |
| Years of Independence | Years of a country's independence from colonial rule. The only two African countries that were not colonized are Liberia and Ethiopia. Liberia proclaimed independence in 1847. We use the year 1855 as independence year for Ethiopia. In 1855 Ethiopia was reunified by the Emperor Tewodros II. Many historians view the coronation of Emperor Tewodros II as the beginning of Ethiopia's modern history. |
| State Antiquity Index | Measures the depth of experience with state-level institutions. The authors began dividing the period 1 to 1950 C.E. into 39 half centuries. Years before 1 C.E. were ignored on the grounds that the experience of more than 2000 years ago would be unlikely to have much effect today, and in order to avoid low-return research effort using low quality information. For each period of fifty years, they asked three questions (and allocated points) as follows:<br>1.) Is there a government above the tribal level? (1 point if yes, 0 points if no)<br>2.) Is this government foreign or locally based? (1 point if locally, 0.5 points if foreign [i.e., the country is a colony], 0.75 if in between [a local government with substantial foreign oversight])<br>3.) How much of the territory of the modern country was ruled by the government? (1 point if over 50 percent, 0.75 points if between 25 percent and 50 percent, 0.5 points if between 10 and 25 percent, 0.3 points if less than 10 percent)<br>Answers were extracted from the historical accounts on each of the countries in the Encyclopedia Britannica.<br>For a given fifty year period, what is today a country has a score of 50 if it is an autonomous nation, 0 if it had no government above the tribal level, 25 if the entire territory was ruled by another country, and so on.<br>To combine the data of the 39 periods, the authors tried alternative rates for discounting the influence of the past, ranging from 0 to a discount of 50 percent for each half century.<br>In their analysis, the authors mainly focus on the variable *statehist05*, which has a discount rate of 5 percent. For that reason, we are using the same variable.<br>Scale is 0-1. Higher values are associated with more depth of experience with state-level institutions.<br>Source: Bockstette, Chanda and Putterman (2002)<br>http://www.econ.brown.edu/fac/louis_putterman/antiquity%20index.htm |
| <u>Political determinants</u> | |
| Years of ancient state history | Logarithm of Discounted Sum of Years of Ancient Statehood, 1 AD to 1950 AD.<br>Source: Putterman (2007) |
| Vertical legitimacy | Dummy variable that takes on the value of 1 if the post-colonial state is embedded into precolonial relations of authority.<br>Dummy = 1 for Botswana, Burundi, Cape Verde, Ethiopia, Lesotho, Mauritius, Rwanda, Sao Tome and Principe, Seychelles, Swaziland.<br>Source: Englebert (2000) |

| | |
|---|---|
| Fractal | Fractal dimension of the country's political (non-coastline) borders.<br>Source: Alesina, Easterly and Matuszeski (2011) |
| Partitioned | Percentage of a county's population that belongs to a partitioned group. A partitioned group is defined as a group that is present in two bordering countries.<br>Source: Alesina, Easterly and Matuszeski (2011) |
| Communist Legacy | Dummy variable that takes on the value of 1 if a country has been under communist rule.<br>The following countries were under communist rule. Angola: 1975-1992; Benin 1975-1990; Congo Republic 1970-1992; Eritrea 1993-today; Ethiopia 1974-1991; Mozambique 1975-1990; Somalia 1976-1991.<br>Source: Constructed by the authors. |
| Executive Constraints | a) Constraints on the executive in the first year of independence (i.e. the first year a country enters the data set) .<br>b) Mean constraints on the executive between first year of independence and 2013.<br>c) Mean constraints on the executive between 1961 and 2013.<br>This variable refers to the extent of institutionalized constraints on the decision making powers of chief executives, whether individuals or collectivities. Such limitations may be imposed by any "accountability groups." In Western democracies these are usually legislatures. Other kinds of accountability groups are the ruling party in a one-party state, councils of nobles or powerful advisors in monarchies, the military in coup-prone polities, and in many states a strong, independent judiciary. The concern is therefore with the checks and balances between the various parts of the decision-making process.<br>Scale is 1-7. A high value equates to high constraints on the executive concomitant with effective checks and balances systems.<br>Source: Marshall, Jaggers and Gurr (2014). Center for Systemic Peace. Polity IV Project, Political Regime Characteristics and Transitions, 1800-2013. http://www.systemicpeace.org/inscrdata.html |
| Internal Conflict | This is an assessment of political violence in the country and its actual or potential impact on governance. To avoid awkwardness in interpreting the coefficients, we recoded the measure so that a high number reflects a higher degree of internal conflict. The lowest rating is given to those countries where there is no armed or civil opposition to the government and the government does not indulge in arbitrary violence, direct or opposition to the government and the government does not indulge in arbitrary violence, direct or indirect, against its own people. The highest rating is given to a country embroiled in an on-going civil war.<br>Scale is 0-12.<br>Source: ICRG Index from PRS Group |
| External Conflict | The external conflict measure is an assessment both of the risk to the incumbent government from foreign action, ranging from non-violent external pressure (diplomatic pressures, withholding of aid, trade restrictions, territorial disputes, sanctions, etc.) to violent external pressure (cross-border conflicts to all-out war). To avoid awkwardness in interpreting the coefficients, we recoded the measure so that a high number reflects a higher degree of external conflict. A low score equates to a very low risk and a high score equates to a very high risk.<br>Scale is 0-12.<br>Source: ICRG Index from PRS Group |

| | |
|---|---|
| Domestic Violence | Intensity of Total Internal Conflict (civil, ethnic violence and war) involving the state in that year. Scale is 0-10.<br>Source: Marshall (2014). Center for Systemic Peace. Major Episodes of Political Violence, 1946-2013 (War List)<br>http://www.systemicpeace.org/warlist.html<br>http://www.systemicpeace.org/inscrdata.html |
| External Violence | Intensity of Total External Conflict (interstate violence and war) involving thestate in that year. Scale is 0-10.<br>Source: Marshall (2014). Center for Systemic Peace. Major Episodes of Political Violence, 1946-2013 (War List)<br>http://www.systemicpeace.org/warlist.html<br>http://www.systemicpeace.org/inscrdata.html |
| **Economic determinants** | |
| GDP per capita | Gross Domestic Product per capita in current and constant (2005) dollars.<br>Sources: Maddison (2010). Statistics on World Population, GDP and Per Capita GDP, 1-2008 AD. Groningen Growth and Development Center (GGDC), University of Groningen, The Netherlands: http://www.ggdc.net/maddison/oriindex.htm; World Development Indicators, World Bank. |
| Gross Public Revenue per capita | Gross public revenue per capita in 1925 or 1929. Measured in 1911 British pounds.<br>Source: Frankema and van Waijenburg (2014) |
| **Legal determinants** | |
| Legal Origin | Identifies the legal origin of the company law or commercial code of each country. There are originally five possible origins: (1) English Common Law, (2) French Commercial Code, (3) Socialist/Communist Laws, (4) German Commercial Code and (5) Scandinavian Commercial Code. Legal systems in Africa either belong to the English common law or the French civil law family. Dummy variable that takes on the value of 1 for countries with English legal origin, 0 for countries with French legal origin.<br>Source: La Porta et al. (1999) |
| **Cultural determinants** | |
| Ethnolinguistic Fractionalization | Measures the probability that two randomly selected people from a given country will not belong to the same ethnolinguistic group. Scale is 0-1. A higher index is associated with a higher probability.<br>Source: Easterly and Levine (1997) |
| Polarization Index | Measures the degree to which several ethnic groups are dominant in a country. Levels of ethnic polarization vary with the size of rival ethnic groups. A higher index is associated with a higher polarization (e.g. two rivalling ethnic groups have more or less the same size). A lower index is associated with a lower polarization (e.g. the disparity in size between the majority and minority ethnic group is large).<br>Source: Montalvo and Reynal-Querol (2005) |

| | |
|---|---|
| Ethnic Tensions | This component is an assessment of the degree of tension within a country attributable to racial, nationality, or language divisions. To avoid awkwardness in interpreting the coefficients, we recoded the measure so that a high number reflects a higher degree of ethnic tensions. Higher ratings are given to countries where racial and nationality tensions are high because opposing groups are intolerant or unwilling to compromise. Lower ratings are given to countries where tensions are minimal. Scale is 0-6.<br>Source: ICRG Index from PRS Group |
| Religion Shares | Identifies the percentage of the population of each country that belonged to the three most widely spread religions in the world in 1980. The numbers are in percent (scale from 0 to 100). The three religions identified are Roman Catholic, Protestant, and Muslim. The residual is called "other religions".<br>Source: La Porta et al. (1999) |
| Geographical determinants | |
| Oil Production Dummy | Indicator ranges between 0 and 1. Equal to 1 if country was oil producer in each year in the period studied. Equal to 0 if country has never been an oil producer in each year in the period studied<br>Own calculations based on: US Energy Information Administration (EIA) Agency (2014); Ross (2013-02), "Oil and Gas Data, 1932-2011". http://thedata.harvard.edu/dvn/dv/mlross/faces/study/StudyPage.xhtml?globalId=hdl:1902.1/20369 |
| Oil production | Average annual oil production per thousand inhabitants from 1970 to 2000. Crude petroleum is measured in thousands of carats.<br>Source: Nunn (2008) using British Geological Survey's World Mineral Statistics and World Mineral Production<br>http://scholar.harvard.edu/nunn/pages/data-0 |
| Gold production | Average annual gold production per thousand inhabitants from 1970 to 2000. Mined gold is measured in kilograms.<br>Source: Nunn (2008) using British Geological Survey's World Mineral Statistics and World Mineral Production<br>http://scholar.harvard.edu/nunn/pages/data-0 |
| Diamond production | Average annual diamond production per thousand inhabitants from 1970 to 2000. Diamonds indude both gemstones and industrial diamonds and are measured in thousands of carats.<br>Source: Nunn (2008) using British Geological Survey's World Mineral Statistics and World Mineral Production<br>http://scholar.harvard.edu/nunn/pages/data-0 |
| TseTse Suitability Index (TSI) | The TseTse suitability index (TSI) is a measure for the potential prevalence of the TseTse fly in a region. Using the *potential* rather than the *observed* prevalence as index purges the estimates of bias arising from states with stronger institutions being better able to control the fly. A high index corresponds to a highly TseTse suitable area. A low index corresponds to a less TseTse suitable area within Africa. The index is created using insect physiology and demographic modeling<br>Source: Alsan (2015) |
| Latitude | Latitude of country centroid. In those countries where the country centroid fell in the ocean, it was moved to within the nearest land boundary.<br>Source: Gallup, Sachs and Mellinger (1999) |

| | |
|---|---|
| Climate zone A | Percent of cultivated land in Koppen–Geiger climate zone A (humid climate with no winter).<br>Source: Gallup, Sachs and Mellinger (1999) |
| Climate zone B | Percent of cultivated land in Koppen–Geiger climate zone B (dry climate with no winter).<br>Source: Gallup, Sachs and Mellinger (1999) |
| Distance | Mean distance to nearest coastline or sea-navigable river (km).<br>Source: Gallup, Sachs and Mellinger (1999) |
| % Mountainous Terrain | Proportion of the country that is mountainous terrain.<br>Source: Fearon and Laitin (2003) |

## Demographic determinants

| | |
|---|---|
| Population | Total population is based on the de facto definition of population which counts all residents regardless of legal status or citizenship. Refugees not permanently settled in the country of asylum are generally considered to be part of the population of their country of origin.<br>Source: Maddison (2010). Statistics on World Population, GDP and Per Capita GDP, 1-2008 AD. Groningen Growth and Development Center (GGDC), University of Groningen, The Netherlands: http://www.ggdc.net/maddison/oriindex.htm; World Development Indicators, World Bank. |
| Population Density | Total population in 1400 (1960) divided by land area in square kilometers. Total population is based on the de facto definition of population which counts all residents regardless of legal status or citizenship. Refugees not permanently settled in the country of asylum are generally considered to be part of the population of their country of origin. Land area is a country's total area, exduding area under inland water bodies. In most cases the definition of inland water bodies indudes major rivers and lakes.<br>Source: Data for 1400 comes from Parker (1997). Data for 1960 comes from World Bank World Development Indicators (2014). |
| % of European descent | Measure of European settlements. Data on the percent of European descent are available for the years 1900 and 1975.<br>Scale is 0-100<br>Source: Published in Acemoglu, Johnson & Robinson (2001) based on McEvedy and Jones (1975) and Curtin, Feierman, Thompson and Vansina (1995). |

## APPENDIX 2: DESCRIPTIVE STATISTICS

**Table A2.1:** Summary statistics for the static analysis

| Variable | Obs. | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| *Dependent variables* | | | | | |
| Bureaucratic Quality in 2014 | 37 | 1.30 | 0.77 | 0 | 2.50 |
| Bureaucratic Quality, 1984-2014 | 37 | 1.39 | 0.71 | 0 | 2.83 |
| Bureaucratic Quality, 1996-2014 | 37 | 1.27 | 0.72 | 0 | 2.31 |
| *Main explanatory variables* | | | | | |
| Precolonial Political Centralization | 48 | 0.59 | 0.33 | 0 | 1 |
| Aid as % of GDP, 1961-2013 | 53 | 14.45 | 9.73 | 0.12 | 41.46 |
| *Main Controls* | | | | | |
| Log GDP/capita, 1961-2013 | 53 | 6.60 | 1.01 | 5.06 | 9.14 |
| External War Threat, 1961-2013 | 51 | 0.05 | 0.13 | 0 | 0.75 |
| Domestic Violence, 1961-2013 | 51 | 0.70 | 1.15 | 0 | 5.05 |
| Oil Production Dummy, 1961-2013 | 53 | 0.26 | 0.39 | 0 | 1 |
| Legal Origin | 53 | 0.34 | 0.48 | 0 | 1 |
| Log Population density, 1400 | 52 | 0.11 | 1.33 | -2.30 | 3.04 |
| Partitioned Dimension | 41 | 48 | 30.67 | 0 | 100 |
| *Additional Controls* | | | | | |
| Log Fractal Dimension | 45 | 0.03 | 0.01 | 0 | 0.07 |
| Log Slave Exports, normalized by area | 52 | 3.26 | 3.89 | -2.30 | 8.82 |
| Log Slave Exports, normalized by population | 52 | 9.26 | 3.68 | 3.91 | 14.40 |
| State Antiquity | 46 | 0.33 | 0.23 | 0.03 | 0.96 |
| Log Years of Ancient Statehood | 46 | 5.37 | 0.88 | 3.22 | 6.76 |
| Communist Legacy | 53 | 0.13 | 0.34 | 0 | 1 |
| Gross Public Revenue per capita, 1925 | 27 | 0.36 | 0.45 | 0.04 | 2.26 |
| Vertical Legitimacy | 48 | 0.21 | 0.41 | 0 | 1 |
| Executive constraints, in Independence Year | 51 | 3.49 | 2.13 | 1 | 7 |
| Executive constraints, 1961-2013 | 51 | 3.04 | 1.31 | 1.32 | 7 |
| Independence Years (until 2014) | 53 | 55.25 | 24.95 | 21 | 167 |
| Average Diamond Production per capita, 1970-2000 | 52 | -5.49 | 2.40 | -6.91 | 2.19 |
| Average Gold Production per capita, 1970-2000 | 52 | -7.48 | 5.66 | -13.82 | 3.08 |
| Average Oil Production per capita, 1970-2000 | 52 | -6.71 | 4.03 | -9.21 | 3.24 |
| % of European descent, 1900 | 50 | 3.27 | 14.23 | 0 | 1 |
| % Catholics | 53 | 27.64 | 30.09 | 0 | 96.60 |
| % Protestants | 53 | 11.02 | 13.67 | 0 | 64.20 |
| % Muslims | 53 | 33.03 | 36.93 | 0 | 99.80 |
| % Other Religions | 53 | 28.32 | 21.38 | 0.20 | 64.10 |
| Ethnolinguistic Fractionalization | 42 | 0.62 | 0.27 | 0.04 | 0.93 |
| Ethnic Polarization Index | 46 | 0.53 | 0.20 | 0.02 | 0.90 |
| Log GDP per capita 1960s (constant) | 30 | 6.40 | 0.85 | 4.98 | 8.29 |
| Log GDP per capita 1970s (constant) | 48 | 6.61 | 0.93 | 5.22 | 9.30 |
| Log GDP per capita 1980s (constant) | 52 | 6.59 | 0.99 | 5.01 | 9.09 |
| Log GDP per capita 1990s (constant) | 53 | 6.54 | 1.08 | 4.63 | 9.20 |
| Log GDP per capita 2000s (constant) | 53 | 6.70 | 1.15 | 5.00 | 9.35 |

**Table A2.2:** Summary statistics for the dynamic analysis

Period 1984-2014

| Variable | Obs. | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| *Dependent variable* | | | | | |
| Δ Bureaucratic Quality, 1984-2014 | 36 | 0.03 | 1.29 | -3 | 2.50 |
| *Explanatory variables* | | | | | |
| Precolonial Centralization | 47 | 0.59 | 0.33 | 0 | 1 |
| Aid as % of GDP, 1984-2013 | 51 | 7.18 | 5.83 | 0 | 24.02 |
| Initial Bureaucratic Quality, 1984 | 35 | 1.04 | 1.07 | 0 | 4 |
| Δ Relative GDP per capita, 1984-2013 | 51 | 0.79 | 3.81 | -0.52 | 27.05 |
| Ethnic Tension, 1984-2013 | 36 | 2.80 | 0.98 | 1.00 | 5.18 |
| Internal Conflict, 1984-2013 | 36 | 4.40 | 1.51 | 1.21 | 8.64 |
| External Conflict, 1984-2013 | 36 | 3.13 | 1.25 | 1.34 | 6.62 |
| Domestic Violence, 1984-2013 | 49 | 0.81 | 1.71 | 0 | 5.73 |
| External Violence, 1984-2013 | 49 | 0.34 | 0.58 | 0 | 4.03 |
| Oil Production Dummy, 1984-2013 | 51 | 0.32 | 0.44 | 0 | 1 |

Period 1984-1995

| Variable | Obs. | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| *Dependent variable* | | | | | |
| Δ Bureaucratic Quality, 1984-1995 | 36 | 0.25 | 1.03 | -2 | 3 |
| *Explanatory variables* | | | | | |
| Precolonial Centralization | 47 | 0.59 | 0.33 | 0 | 1 |
| Aid as % of GDP, 1984-1995 | 51 | 9.19 | 7.93 | 0 | 35.57 |
| Initial Bureaucratic Quality, 1984 | 36 | 1.29 | 1.10 | 0 | 4.00 |
| Δ Relative GDP per capita, 1984-1995 | 51 | -0.01 | 0.32 | -0.90 | 0.78 |
| Ethnic Tension, 1984-1995 | 36 | 3.03 | 0.98 | 0.99 | 5.53 |
| Internal Conflict, 1984-1995 | 36 | 5.52 | 2.06 | 1.73 | 10.15 |
| External Conflict, 1984-1995 | 36 | 3.98 | 1.48 | 1.67 | 6.38 |
| Domestic Violence, 1984-1995 | 49 | 1.00 | 1.66 | 0 | 7.00 |
| External Violence, 1984-1995 | 49 | 0.01 | 0.03 | 0 | 0.17 |
| Oil Production Dummy, 1984-1995 | 51 | 0.28 | 0.44 | 0 | 1 |

Period 1996-2014

| Variable | Obs. | Mean | Std. Dev. | Min | Max |
|---|---|---|---|---|---|
| *Dependent variable* | | | | | |
| Δ Bureaucratic Quality, 1996-2014 | 37 | -0.31 | 0.93 | -3 | 1.50 |
| *Explanatory variables* | | | | | |
| Precolonial Centralization | 48 | 0.59 | 0.33 | 0 | 1 |
| Aid as % of GDP, 1996-2013 | 53 | 5.94 | 5.37 | 0.10 | 27.97 |
| Initial Bureaucratic Quality, 1996 | 37 | 1.64 | 1 | 0 | 3.50 |
| Δ Relative GDP per capita, 1996-2013 | 51 | -0.01 | 0.32 | -0.90 | 0.78 |
| Ethnic Tension, 1996-2013 | 37 | 2.61 | 1.11 | 0.40 | 5.12 |
| Internal Conflict, 1996-2013 | 37 | 3.71 | 1.44 | 0.89 | 7.98 |
| External Conflict, 1996-2013 | 37 | 2.38 | 1.37 | 0.12 | 6.91 |
| Domestic Violence, 1996-2013 | 51 | 0.67 | 1.33 | 0 | 5.56 |
| External Violence, 1996-2013 | 51 | 0.06 | 0.20 | 0 | 0.83 |
| Oil Production Dummy, 1996-2013 | 53 | 0.34 | 0.46 | 0 | 1 |

**Table A2.3:** TseTse Suitability Index in Africa at the national level

| Country | TSI | Country | TSI |
|---|---|---|---|
| Equatorial Guinea | 1.475 | Namibia | -0.329 |
| Gabon | 1.403 | Algeria | -0.345 |
| Liberia | 1.123 | Sudan | -0.352 |
| Congo Republic | 1.015 | Guinea-Bissau | -0.378 |
| Cameroon | 0.986 | Burkina Faso | -0.390 |
| Cote d'Ivoire | 0.978 | Malawi | -0.420 |
| Sierra Leone | 0.850 | Kenya | -0.430 |
| Central African Republic | 0.815 | Zambia | -0.434 |
| Mozambique | 0.807 | Eritrea | -0.482 |
| Benin | 0.754 | Tanzania | -0.530 |
| Democratic Republic of Congo | 0.725 | Niger | -0.692 |
| Togo | 0.601 | Burundi | -0.729 |
| Ghana | 0.541 | Mauritania | -0.822 |
| Guinea | 0.526 | Rwanda | -0.875 |
| Somalia | 0.489 | Zimbabwe | -0.956 |
| Botswana | 0.369 | Mali | -0.963 |
| Libya | 0.329 | Senegal | -0.994 |
| Nigeria | 0.285 | Ethiopia | -1.021 |
| Uganda | 0.283 | Swaziland | -1.131 |
| Angola | 0.278 | Morocco | -1.205 |
| Egypt | 0.050 | Tunisia | -1.265 |
| Chad | -0.244 | South Africa | -2.708 |

*Notes:* The TseTse Suitability Index has originally been constructed for African ethnic groups at the regional level (Alsan, 2015). African ethnic groups from Cape Verde, Comoros, Djibouti, Gambia, Lesotho, Madagascar, Mauritius, Sao Tomé and Principe and Seychelles were not induded in the analysis.

## APPENDIX 3: ADDITIONAL ESTIMATION TABLES

**Table A3.1: Aid Dependence and Change in Bureaucratic Quality controlling for initial conditions, 1984-2014, OLS estimates**

| Dependent Variable: | OLS | OLS | OLS | OLS | OLS |
|---|---|---|---|---|---|
| Δ Bureaucratic Quality, 1984-2014 | (1) | (2) | (3) | (4) | (5) |
| Initial Bureaucratic Quality | -1.03*** | -0.98*** | -1.05*** | -1.16*** | -1.00*** |
| | (0.14) | (0.13) | (0.14) | (0.16) | (0.13) |
| Mean Aid Dependence, 1984-2013 | -6.00** | -4.68* | -4.79** | -5.92** | -5.53** |
| | (2.48) | (2.53) | (2.31) | (2.29) | (2.55) |
| Mean Aid Dependence, 1984-2013 | 0.42 | -0.40 | -0.15 | 1.24 | -0.29 |
| x Initial Bureaucratic Quality | (1.68) | (1.62) | (1.77) | (1.76) | (1.57) |
| Δ Relative GDP per capita, 1984-2013 | | 0.31* | 0.15 | 0.28 | 0.33** |
| | | (0.17) | (0.16) | (0.17) | (0.15) |
| Mean Ethnic Tensions, 1984-2013 | | | -0.27** | | |
| | | | (0.12) | | |
| Mean Domestic Violence, 1984-2013 | | | | -0.15** | |
| | | | | (0.07) | |
| Mean External Violence, 1984-2013 | | | | 0.22* | |
| | | | | (0.11) | |
| Oil Production Dummy, 1984-2013 | | | | | -0.57 |
| | | | | | (0.47) |
| Constant | 1.72*** | 1.49*** | 2.40*** | 1.81*** | 1.61*** |
| | (0.27) | (0.29) | (0.44) | (0.30) | (0.32) |
| Observations | 36 | 36 | 36 | 36 | 36 |
| $R^2$ | 0.70 | 0.73 | 0.76 | 0.76 | 0.73 |
| adj. $R^2$ | 0.67 | 0.69 | 0.72 | 0.71 | 0.69 |

*Notes:* Robust standard errors are shown in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level.

**Table A3.2: Aid Dependence and Change in Bureaucratic Quality controlling for initial conditions, 1984-1995, OLS estimates**

| Dependent Variable: Δ Bureaucratic Quality, 1984-1995 | (1) OLS | (2) OLS | (3) OLS | (4) OLS | (5) OLS |
|---|---|---|---|---|---|
| Initial Bureaucratic Quality | -0.63*** | -0.63*** | -0.63*** | -0.64*** | -0.61*** |
| | (0.14) | (0.15) | (0.16) | (0.17) | (0.17) |
| Mean Aid Dependence, 1984-1995 | -4.95* | -4.28 | -4.30 | -4.40 | -2.40 |
| | (2.78) | (2.58) | (2.60) | (2.86) | (3.03) |
| Mean Aid Dependence, 1984-1995 x Initial Bureaucratic Quality | 0.52 | -0.17 | -0.16 | -0.02 | -0.69 |
| | (2.43) | (2.30) | (2.32) | (2.67) | (2.33) |
| Δ Relative GDP per capita, 1984-1995 | | 0.81 | 0.83 | 0.77 | 0.98* |
| | | (0.52) | (0.62) | (0.55) | (0.49) |
| Mean Ethnic Tensions, 1984-1995 | | | 0.01 | | |
| | | | (0.14) | | |
| Mean Domestic Violence, 1984-1995 | | | | -0.05 | |
| | | | | (0.05) | |
| Mean External Violence, 1984-1995 | | | | 1.21 | |
| | | | | (1.55) | |
| Oil Production Dummy, 1984-1995 | | | | | 0.44 |
| | | | | | (0.33) |
| Constant | 1.40*** | 1.47*** | 1.44** | 1.53*** | 1.20*** |
| | (0.27) | (0.27) | (0.54) | (0.30) | (0.38) |
| Observations | 36 | 36 | 36 | 36 | 36 |
| $R^2$ | 0.47 | 0.51 | 0.51 | 0.51 | 0.54 |
| adj. $R^2$ | 0.41 | 0.44 | 0.43 | 0.41 | 0.46 |

*Notes:* Robust standard errors are shown in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level.

**Table A3.3: Precolonial Centralization and State Capacity in 2014, additional controls, OLS estimates**

| Dependent Variable: Bureaucratic Quality, 2014 | OLS (1) | OLS (2) | OLS (3) | OLS (4) | OLS (5) | OLS (6) | OLS (7) | OLS (8) |
|---|---|---|---|---|---|---|---|---|
| Precolonial Centralization | 1.19*** | 1.40*** | 1.43*** | 1.21** | 1.37*** | 1.31*** | 1.28*** | 1.25*** |
| | (0.42) | (0.34) | (0.32) | (0.44) | (0.42) | (0.35) | (0.34) | (0.35) |
| Slave Exports (area) | -0.03 | | | | | | | |
| | (0.04) | | | | | | | |
| State Antiquity | | -0.09 | | | | | | |
| | | (0.44) | | | | | | |
| Years of Ancient State History | | | -0.04 | | | | | |
| | | | (0.16) | | | | | |
| Vertical Legitimacy | | | | 0.11 | | | | |
| | | | | (0.26) | | | | |
| Fractal Dimension | | | | | -1.90 | | | |
| | | | | | (10.53) | | | |
| Mean Gold Production per capita, 1970-2000 | | | | | | 0.00 | | |
| | | | | | | (0.03) | | |
| Mean Oil Production per capita, 1970-2000 | | | | | | 0.01 | | |
| | | | | | | (0.03) | | |
| Mean Diamond Production per capita, 1970-2000 | | | | | | 0.01 | | |
| | | | | | | (0.05) | | |
| Executive Constraints in Independence Year | | | | | | | -0.02 | |
| | | | | | | | (0.05) | |
| Mean Executive Constraints, 1961-2013 | | | | | | | | 0.10 |
| | | | | | | | | (0.08) |
| Constant | 0.76* | 0.52* | 0.72 | 0.58** | 0.58 | 0.65 | 0.64* | 0.27 |
| | (0.38) | (0.30) | (0.93) | (0.26) | (0.50) | (0.43) | (0.36) | (0.34) |
| Observations | 37 | 34 | 34 | 32 | 34 | 37 | 37 | 37 |
| Geography Controls | No | No | No | No | No | No | No | No |
| $R^2$ | 0.31 | 0.32 | 0.32 | 0.23 | 0.34 | 0.30 | 0.30 | 0.32 |
| adj. $R^2$ | 0.27 | 0.28 | 0.28 | 0.17 | 0.29 | 0.21 | 0.26 | 0.28 |

*Notes:* Robust standard errors are shown in parentheses. *** denotes significance at the 1% level, ** at 5% level and * at the 10% level. The variables *Slave Exports*, *Years of Ancient State History*, *Fractal Dimension*, *Gold Production*, *Oil Production* and *Diamond Production* are log transformed.

| Dependent Variable: Bureaucratic Quality, 2014 | (9) OLS | (10) OLS | (11) OLS | (12) OLS | (13) OLS | (14) OLS | (15) OLS | (16) OLS |
|---|---|---|---|---|---|---|---|---|
| Precolonial Centralization | 1.31*** | 1.24* | 0.89* | 1.32*** | 1.36*** | 1.39*** | 1.30*** | 1.21*** |
| | (0.32) | (0.61) | (0.45) | (0.31) | (0.40) | (0.36) | (0.34) | (0.34) |
| Years of Independence | -0.00* | | | | | | | |
| | (0.00) | | | | | | | |
| Gross public revenue per capita, 1925 | | -0.34 | | | | | | |
| | | (0.48) | | | | | | |
| Mean GDP per capita, 1970s (constant 2005 USD) | | | -0.28 | | | | | |
| | | | (0.41) | | | | | |
| Mean GDP per capita, 1980s (constant 2005 USD) | | | -0.53 | | | | | |
| | | | (0.64) | | | | | |
| Mean GDP per capita, 1990s (constant 2005 USD) | | | 0.34 | | | | | |
| | | | (0.43) | | | | | |
| Mean GDP per capita, 2000s (constant 2005 USD) | | | 0.50 | | | | | |
| | | | (0.45) | | | | | |
| Communist Legacy | | | | -0.37** | | | | |
| | | | | (0.18) | | | | |
| European Descent in 1900 | | | | | -0.04 | | | |
| | | | | | (0.04) | | | |
| Ethnolinguistic Fractionalization | | | | | | -0.03 | | |
| | | | | | | (0.36) | | |
| Polarization Index | | | | | | | 0.36 | |
| | | | | | | | (0.47) | |
| Catholic | | | | | | | | 0.00 |
| | | | | | | | | (0.01) |
| Protestant | | | | | | | | 0.01 |
| | | | | | | | | (0.01) |
| Muslim | | | | | | | | 0.00 |
| | | | | | | | | (0.00) |
| Constant | 0.74** | 0.78* | 0.58 | 0.60** | 0.60** | 0.51 | 0.36 | 0.22 |
| | (0.29) | (0.37) | (0.76) | (0.25) | (0.27) | (0.36) | (0.35) | (0.42) |
| Observations | 37 | 22 | 34 | 37 | 35 | 34 | 34 | 37 |
| Geography Controls | No | No | No | No | No | No | No | No |
| $R^2$ | 0.31 | 0.21 | 0.45 | 0.32 | 0.26 | 0.32 | 0.30 | 0.32 |
| adj. $R^2$ | 0.27 | 0.12 | 0.36 | 0.28 | 0.21 | 0.27 | 0.26 | 0.24 |

*Notes:* Robust standard errors are shown in parentheses. *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level. The variable *Mean GDP per capita* is log transformed.

**Table A3.4: Precolonial Centralization and State Capacity in 2014, additional controls (including geography), OLS estimates**

| Dependent Variable: | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS |
|---|---|---|---|---|---|---|---|---|
| Bureaucratic Quality, 2014 | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Precolonial Centralization | 1.23** | 1.53*** | 1.50** | 1.26 | 1.35** | 1.32** | 1.29** | 1.23** |
| | (0.56) | (0.53) | (0.55) | (0.76) | (0.58) | (0.59) | (0.53) | (0.52) |
| Slave Exports (area) | -0.04 | | | | | | | |
| | (0.04) | | | | | | | |
| State Antiquity | | -0.73 | | | | | | |
| | | (0.97) | | | | | | |
| Years of Ancient State History | | | -0.10 | | | | | |
| | | | (0.25) | | | | | |
| Vertical Legitimacy | | | | 0.12 | | | | |
| | | | | (0.42) | | | | |
| Fractal Dimension | | | | | -0.80 | | | |
| | | | | | (13.18) | | | |
| Mean Gold Production | | | | | | 0.02 | | |
| | | | | | | (0.03) | | |
| Mean Oil Production | | | | | | 0.01 | | |
| | | | | | | (0.03) | | |
| Mean Diamond Production | | | | | | 0.01 | | |
| | | | | | | (0.06) | | |
| Executive Constraints in Independence Year | | | | | | | -0.01 | |
| | | | | | | | (0.07) | |
| Mean Executive Constraints, 1961-2013 | | | | | | | | 0.23 |
| | | | | | | | | (0.16) |
| Constant | 0.88 | 0.54 | 0.91 | 0.69 | 0.66 | 0.97 | 0.72 | -0.00 |
| | (0.74) | (0.74) | (1.22) | (0.84) | (0.92) | (0.91) | (0.71) | (0.91) |
| Observations | 37 | 34 | 34 | 32 | 34 | 37 | 37 | 37 |
| Geography Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | 0.34 | 0.38 | 0.37 | 0.26 | 0.39 | 0.34 | 0.33 | 0.39 |
| adj. $R^2$ | 0.19 | 0.21 | 0.20 | 0.04 | 0.22 | 0.12 | 0.17 | 0.24 |

*Notes:* Robust standard errors are shown in parentheses *** denotes significance at the 1% level, ** at the 5% level, * at the 10% level. The variables *Slave Exports* and *Years of Ancient State History, Fractal Dimension, Gold Production, Oil Production* and *Diamond Production* are log transformed. Geography controls are *Latitude*, *Log Mountainous Terrain*, *% of cultivated land in Köppen–Geiger climate zone A (humid climate with no winter)* and *climate zone B (dry climate with no winter)* and *Mean distance to nearest coastline or sea-navigable river (km)*.

| Dependent Variable: Bureaucratic Quality, 2014 | OLS (9) | OLS (10) | OLS (11) | OLS (12) | OLS (13) | OLS (14) | OLS (15) | OLS (16) |
|---|---|---|---|---|---|---|---|---|
| Precolonial Centralization | 1.28** | 1.28 | 0.85 | 1.32** | 1.11* | 1.38** | 1.34** | 1.28** |
| | (0.54) | (1.09) | (0.57) | (0.49) | (0.62) | (0.55) | (0.56) | (0.52) |
| Years of Independence | -0.00** | | | | | | | |
| | (0.00) | | | | | | | |
| Gross public revenue per capita, 1925 | | 0.01 | | | | | | |
| | | (1.00) | | | | | | |
| Mean GDP per capita, 1970s (constant 2005 USD) | | | -0.41 | | | | | |
| | | | (0.43) | | | | | |
| Mean GDP per capita, 1980s (constant 2005 USD) | | | -0.55 | | | | | |
| | | | (0.65) | | | | | |
| Mean GDP per capita, 1990s (constant 2005 USD) | | | 0.39 | | | | | |
| | | | (0.46) | | | | | |
| Mean GDP per capita, 2000s (constant 2005 USD) | | | 0.60 | | | | | |
| | | | (0.48) | | | | | |
| Communist Legacy | | | | -0.48** | | | | |
| | | | | (0.23) | | | | |
| European Descent in 1900 | | | | | -0.04 | | | |
| | | | | | (0.04) | | | |
| Ethnolinguistic Fractionalization | | | | | | 0.26 | | |
| | | | | | | (0.54) | | |
| Polarization Index | | | | | | | 0.44 | |
| | | | | | | | (0.49) | |
| Catholic | | | | | | | | 0.00 |
| | | | | | | | | (0.01) |
| Protestant | | | | | | | | 0.02 |
| | | | | | | | | (0.01) |
| Muslim | | | | | | | | 0.00 |
| | | | | | | | | (0.01) |
| Constant | 1.01 | 0.59 | 1.01 | 0.71 | 1.00 | 0.52 | 0.45 | 0.34 |
| | (0.72) | (0.99) | (0.94) | (0.68) | (0.73) | (0.79) | (0.78) | (0.93) |
| Observations | 37 | 22 | 34 | 37 | 35 | 34 | 34 | 37 |
| Geography Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | 0.36 | 0.25 | 0.55 | 0.37 | 0.32 | 0.36 | 0.35 | 0.37 |
| adj. $R^2$ | 0.20 | -0.12 | 0.35 | 0.22 | 0.14 | 0.18 | 0.17 | 0.16 |

*Notes:* Robust standard errors are shown in parentheses. *** denotes significance at the 1% level, ** at the 5% level and * at 10% level. The variable *Mean GDP per capita* is log transformed. Geography controls are *Latitude*, *Log Mountainous Terrain*, *% of cultivated land in Köppen–Geiger climate zone A (humid climate with no winter)* and *climate zone B (dry climate with no winter)* and *Mean distance to nearest coastline or sea-navigable river (km).*

## Table A3.5: Precolonial Centralization and State Capacity in 1984, OLS estimates

| Dependent Variable: | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bureaucratic Quality, 1984 | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| Precolonial Centralization | 0.53 | -0.70 | 0.75 | -0.50 | 0.35 | -1.25 | 0.56 | -0.67 | 0.52 | -0.57 | 0.58 | -0.61 |
| | (0.79) | (0.77) | (0.92) | (0.92) | (0.78) | (1.14) | (0.80) | (0.60) | (0.79) | (0.81) | (0.79) | (0.90) |
| British | | | 0.38 | 0.74 | | | | | | | | |
| | | | (0.67) | (0.83) | | | | | | | | |
| French | | | 1.17 | 1.84** | | | | | | | | |
| | | | (0.69) | (0.75) | | | | | | | | |
| Belgian | | | -0.49 | 1.77 | | | | | | | | |
| | | | (0.60) | (1.08) | | | | | | | | |
| Portuguese | | | 1.52** | 1.25 | | | | | | | | |
| | | | (0.59) | (0.88) | | | | | | | | |
| Mean GDP per Capita, 61-84 | | | | | 0.75* | 0.39 | | | | | | |
| | | | | | (0.38) | (0.36) | | | | | | |
| Mean Aid Dependence, 61-84 | | | | | 0.28 | -2.65 | | | | | | |
| | | | | | (2.08) | (3.20) | | | | | | |
| Mean Domestic Violence, 61-84 | | | | | 0.02 | 0.03 | | | | | | |
| | | | | | (0.13) | (0.11) | | | | | | |
| Mean External Violence, 61-84 | | | | | 0.65 | 0.73 | | | | | | |
| | | | | | (1.04) | (1.62) | | | | | | |
| Oil Production Dummy, 61-84 | | | | | -0.75 | -0.54 | | | | | | |
| | | | | | (0.79) | (0.89) | | | | | | |
| Legal Origin | | | | | | | -0.52 | -1.10*** | | | | |
| | | | | | | | (0.46) | (0.33) | | | | |
| Population Density in 1400 | | | | | | | | | -0.20 | -0.14 | | |
| | | | | | | | | | (0.28) | (0.23) | | |
| Partitioned | | | | | | | | | | | -0.00 | -0.00 |
| | | | | | | | | | | | (0.01) | (0.01) |
| Constant | 0.82 | 3.06** | 0.00 | 1.51 | -3.93 | 1.75 | 1.03 | 3.50*** | 0.93* | 2.95** | 0.93 | 2.93* |
| | (0.54) | (1.25) | (0.00) | (0.95) | (2.46) | (3.60) | (0.62) | (1.04) | (0.54) | (1.29) | (0.61) | (1.42) |
| Observations | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 25 | 23 | 23 |
| Geography controls | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| $R^2$ | 0.02 | 0.50 | 0.21 | 0.72 | 0.27 | 0.65 | 0.08 | 0.66 | 0.05 | 0.51 | 0.03 | 0.54 |
| adj. $R^2$ | -0.02 | 0.34 | 0.00 | 0.51 | 0.03 | 0.35 | -0.01 | 0.52 | -0.04 | 0.31 | -0.07 | 0.32 |

*Notes:* The variables *GDP per capita* and *Population Density* are log transformed. Robust standard errors are shown in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level. Geography controls are *Latitude*, *Log Mountainous Terrain*, *% of cultivated land in Köppen–Geiger climate zone A (humid climate with no winter)* and *climate zone B (dry climate with no winter)* and *Mean distance to nearest coastline or sea-navigable river (km).*

**Table A3.6: Precolonial Centralization and Average State Capacity 1996-2014, main controls, OLS estimates**

| Dependent Variable: | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Bureaucratic Quality, 1996-2014 | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| Precolonial Centralization | 1.17*** | 1.17*** | 1.11*** | 1.19** | 1.06*** | 1.09 | 1.19*** | 1.25** | 1.16*** | 1.16** | 1.29*** | 1.49** |
| | (0.33) | (0.54) | (0.36) | (0.57) | (0.38) | (0.64) | (0.35) | (0.54) | (0.33) | (0.55) | (0.35) | (0.35) |
| British | | | 0.68*** | 0.85*** | | | | | | | | |
| | | | (0.26) | (0.30) | | | | | | | | |
| French | | | 0.51** | 0.68*** | | | | | | | | |
| | | | (0.20) | (0.22) | | | | | | | | |
| Belgian | | | -0.77*** | -0.62 | | | | | | | | |
| | | | (0.13) | (0.37) | | | | | | | | |
| Portuguese | | | 0.38 | 0.40 | | | | | | | | |
| | | | (0.31) | (0.38) | | | | | | | | |
| Mean GDP per Capita, 1961-1996 | | | | | 0.15 | 0.11 | | | | | | |
| | | | | | (0.13) | (0.15) | | | | | | |
| Mean Aid Dependence, 1961-1996 | | | | | -0.71 | -0.57 | | | | | | |
| | | | | | (0.82) | (1.01) | | | | | | |
| Mean Domestic Violence, 1961-1996 | | | | | -0.07 | -0.09 | | | | | | |
| | | | | | (0.05) | (0.07) | | | | | | |
| Mean External Violence, 1961-1996 | | | | | 0.49 | 0.18 | | | | | | |
| | | | | | (0.74) | (1.23) | | | | | | |
| Oil Production Dummy, 1961-1996 | | | | | -0.26 | -0.31 | | | | | | |
| | | | | | (0.26) | (1.19) | | | | | | |
| Legal Origin | | | | | | | 0.27 | 0.32 | | | | |
| | | | | | | | (0.20) | (0.25) | | | | |
| Population Density in 1400 | | | | | | | | | 0.03 | 0.02 | | |
| | | | | | | | | | (0.11) | (0.16) | | |
| Partitioned | | | | | | | | | | | 0.00 | 0.00 |
| | | | | | | | | | | | (0.00) | (0.00) |
| Constant | 0.61** | 0.82 | 0.13 | 0.01 | -0.08 | 0.22 | 0.48* | 0.61 | 0.59** | 0.82 | 0.50 | 0.05 |
| | (0.24) | (0.63) | (0.18) | (0.59) | (0.86) | (1.48) | (0.26) | (0.67) | (0.26) | (0.64) | (0.34) | (0.68) |
| Observations | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 32 | 32 |
| Geography controls | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes | No | Yes |
| $R^2$ | 0.27 | 0.31 | 0.41 | 0.46 | 0.33 | 0.37 | 0.30 | 0.35 | 0.27 | 0.31 | 0.34 | 0.43 |
| adj. $R^2$ | 0.25 | 0.17 | 0.31 | 0.25 | 0.20 | 0.09 | 0.26 | 0.19 | 0.23 | 0.14 | 0.29 | 0.26 |

*Notes:* The variables *GDP per capita* and *Population Density* are log transformed. Robust standard errors are shown in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level. Geography controls are *Latitude*, *Log Mountainous Terrain*, *% of cultivated land in Köppen–Geiger climate zone A (humid climate with no winter)* and *climate zone B (dry climate with no winter)* and *Mean distance to nearest coastline or sea-navigable river (km)*.

**Table A3.7: Precolonial Centralization and Average State Capacity 1996-2014, additional controls, OLS estimates**

| Dependent Variable: | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS |
|---|---|---|---|---|---|---|---|---|
| Mean Bureaucratic Quality, 1996-2014 | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Precolonial Centralization | 0.96** | 0.92** | 1.28*** | 1.32*** | 1.11** | 1.28*** | 1.16*** | 1.09*** |
| | (0.41) | (0.40) | (0.32) | (0.30) | (0.43) | (0.41) | (0.33) | (0.35) |
| Slave Exports (area) | -0.05 | | | | | | | |
| | (0.03) | | | | | | | |
| Slave Exports (population) | | -0.07* | | | | | | |
| | | (0.03) | | | | | | |
| State Antiquity | | | -0.30 | | | | | |
| | | | (0.44) | | | | | |
| Years of Ancient State History | | | | -0.11 | | | | |
| | | | | (0.16) | | | | |
| Vertical Legitimacy | | | | | 0.01 | | | |
| | | | | | (0.34) | | | |
| Fractal Dimension | | | | | | 0.62 | | |
| | | | | | | (9.94) | | |
| Executive Constraints in Independence Year | | | | | | | -0.01 | |
| | | | | | | | (0.05) | |
| Mean Executive Constraints, 1961-1996 | | | | | | | | 0.12 |
| | | | | | | | | (0.07) |
| Constant | 0.95** | 1.46*** | 0.64** | 1.11 | 0.63** | 0.54 | 0.65* | 0.33 |
| | (0.37) | (0.53) | (0.30) | (0.91) | (0.26) | (0.49) | (0.33) | (0.30) |
| Observations | 37 | 37 | 34 | 34 | 32 | 34 | 37 | 37 |
| Geography Controls | No | No | No | No | No | No | No | No |
| $R^2$ | 0.31 | 0.33 | 0.29 | 0.30 | 0.21 | 0.32 | 0.27 | 0.31 |
| adj. $R^2$ | 0.27 | 0.29 | 0.24 | 0.25 | 0.15 | 0.27 | 0.22 | 0.27 |

*Notes:* Robust standard errors are shown in parentheses *** denotes significance at the 1% level, ** at the 5% level, * at the 10% level. The variables *Slave Exports*, *Years of Ancient State History*, *Fractal Dimension* and *GDP per capita* are log transformed.

| Dependent Variable: | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS |
|---|---|---|---|---|---|---|---|---|
| Mean Bureaucratic Quality, 1996-2014 | (9) | (10) | (11) | (12) | (13) | (14) | (15) | (16) |
| Precolonial Centralization | 1.17*** | 0.92 | 1.10*** | 1.18*** | 1.19*** | 1.25*** | 1.20*** | 1.07*** |
| | (0.32) | (0.58) | (0.38) | (0.31) | (0.38) | (0.37) | (0.34) | (0.35) |
| Years of Independence | -0.00** | | | | | | | |
| | (0.00) | | | | | | | |
| Gross public revenue per capita, 1925 | | -0.22 | | | | | | |
| | | (0.46) | | | | | | |
| Mean GDP per capita, 1970s (constant 2005 USD) | | | -0.77** | | | | | |
| | | | (0.36) | | | | | |
| Mean GDP per capita, 1980s (constant 2005 USD) | | | 0.78** | | | | | |
| | | | (0.37) | | | | | |
| Communist Legacy | | | | -0.48*** | | | | |
| | | | | (0.17) | | | | |
| European Descent in 1900 | | | | | -0.00 | | | |
| | | | | | (0.02) | | | |
| Ethnolinguistic Fractionalization | | | | | | -0.05 | | |
| | | | | | | (0.37) | | |
| Polarization Index | | | | | | | 0.22 | |
| | | | | | | | (0.46) | |
| Catholic | | | | | | | | 0.00 |
| | | | | | | | | (0.01) |
| Protestant | | | | | | | | 0.01 |
| | | | | | | | | (0.01) |
| Muslim | | | | | | | | 0.00 |
| | | | | | | | | (0.00) |
| Constant | 0.77*** | 0.88** | 0.62 | 0.67*** | 0.60** | 0.59 | 0.47 | 0.32 |
| | (0.27) | (0.35) | (0.80) | (0.24) | (0.25) | (0.39) | (0.34) | (0.39) |
| Observations | 37 | 22 | 34 | 37 | 37 | 34 | 34 | 37 |
| Geography Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | 0.29 | 0.14 | 0.37 | 0.32 | 0.27 | 0.30 | 0.29 | 0.30 |
| adj. $R^2$ | 0.25 | 0.05 | 0.31 | 0.28 | 0.22 | 0.25 | 0.24 | 0.22 |

*Notes:* Robust standard errors are shown in parentheses. *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level. The variable *Mean GDP per capita* is log transformed.

**Table A3.8: Precolonial Centralization and Average State Capacity 1996-2014, additional and geography controls, OLS estimates**

| Dependent Variable: | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS |
|---|---|---|---|---|---|---|---|---|
| Mean Bureaucratic Quality, 1996-2014 | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Precolonial Centralization | 1.05* | 0.99* | 1.40** | 1.40** | 1.07 | 1.26** | 1.17** | 0.99* |
| | (0.56) | (0.57) | (0.52) | (0.53) | (0.74) | (0.58) | (0.54) | (0.57) |
| Slave Exports (area) | -0.06 | | | | | | | |
| | (0.04) | | | | | | | |
| Slave Exports (population) | | -0.08* | | | | | | |
| | | (0.04) | | | | | | |
| State Antiquity | | | -0.88 | | | | | |
| | | | (0.97) | | | | | |
| Years of Ancient State History | | | | -0.15 | | | | |
| | | | | (0.24) | | | | |
| Vertical Legitimacy | | | | | 0.04 | | | |
| | | | | | (0.35) | | | |
| Fractal Dimension | | | | | | -0.29 | | |
| | | | | | | (12.41) | | |
| Executive Constraints in Independence Year | | | | | | | -0.00 | |
| | | | | | | | (0.06) | |
| Mean Executive Constraints, 1961-1996 | | | | | | | | 0.20 |
| | | | | | | | | (0.13) |
| Constant | 1.12 | 1.70** | 0.75 | 1.31 | 0.66 | 0.74 | 0.83 | 0.53 |
| | (0.68) | (0.83) | (0.67) | (1.21) | (0.74) | (0.91) | (0.63) | (0.69) |
| Observations | 37 | 37 | 34 | 34 | 32 | 34 | 37 | 37 |
| Geography Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | 0.36 | 0.37 | 0.35 | 0.34 | 0.25 | 0.39 | 0.31 | 0.37 |
| adj. $R^2$ | 0.20 | 0.22 | 0.17 | 0.16 | 0.03 | 0.22 | 0.14 | 0.21 |

*Notes:* Robust standard errors are shown in parentheses *** denotes significance at the 1% level, ** at the 5% level, * at the 10% level. The variables *Slave Exports*, *Years of Ancient State History*, *Fractal Dimension* and *GDP per capita* are log transformed. Geography controls are *Latitude*, *Log Mountainous Terrain*, *% of cultivated land in Köppen–Geiger climate zone A (humid climate with no winter)* and *climate zone B (dry climate with no winter)* and *Mean distance to nearest coastline or sea-navigable river (km)*.

| Dependent Variable: Mean Bureaucratic Quality, 1996-2014 | OLS (9) | OLS (10) | OLS (11) | OLS (12) | OLS (13) | OLS (14) | OLS (15) | OLS (16) |
|---|---|---|---|---|---|---|---|---|
| Precolonial Centralization | 1.15** | 0.88 | 1.14* | 1.20** | 1.19** | 1.26** | 1.24** | 1.15** |
| | (0.55) | (1.00) | (0.59) | (0.48) | (0.56) | (0.55) | (0.57) | (0.52) |
| Years of Independence | -0.01** | | | | | | | |
| | (0.00) | | | | | | | |
| Gross public revenue per capita, 1925 | | 0.23 | | | | | | |
| | | (0.88) | | | | | | |
| Mean GDP per capita, 1970s (constant 2005 USD) | | | -0.93** | | | | | |
| | | | (0.41) | | | | | |
| Mean GDP per capita, 1980s (constant 2005 USD) | | | 0.91** | | | | | |
| | | | (0.44) | | | | | |
| Communist Legacy | | | | -0.62** | | | | |
| | | | | (0.24) | | | | |
| European Descent in 1900 | | | | | -0.01 | | | |
| | | | | | (0.02) | | | |
| Ethnolinguistic Fractionalization | | | | | | 0.29 | | |
| | | | | | | (0.54) | | |
| Polarization Index | | | | | | | 0.28 | |
| | | | | | | | (0.49) | |
| Catholic | | | | | | | | 0.00 |
| | | | | | | | | (0.01) |
| Protestant | | | | | | | | 0.02 |
| | | | | | | | | (0.01) |
| Muslim | | | | | | | | -0.00 |
| | | | | | | | | (0.01) |
| Constant | 1.07* | 0.55 | 1.06 | 0.82 | 0.85 | 0.67 | 0.66 | 0.49 |
| | (0.63) | (0.86) | (0.81) | (0.60) | (0.65) | (0.72) | (0.73) | (0.84) |
| Observations | 37 | 22 | 34 | 37 | 37 | 34 | 34 | 37 |
| Geography Controls | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | 0.34 | 0.21 | 0.45 | 0.39 | 0.31 | 0.34 | 0.33 | 0.36 |
| adj. $R^2$ | 0.19 | -0.19 | 0.27 | 0.24 | 0.14 | 0.16 | 0.16 | 0.14 |

*Notes:* Robust standard errors are shown in parentheses. *** denotes significance at the 1% level, ** at the 5% level and * at the 10% level. The variable *Mean GDP per capita* is log transformed. Geography controls are *Latitude*, *Log Mountainous Terrain*, *% of cultivated land in Köppen–Geiger climate zone A (humid climate with no winter)* and *climate zone B (dry climate with no winter)* and *Mean distance to nearest coastline or sea-navigable river (km).*

**Table A3.9: Aid Dependence, Precolonial Centralization and Change in Bureaucratic Quality controlling for initial conditions, 1984-2014, OLS estimates**

| Dependent Variable: | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS | OLS |
|---|---|---|---|---|---|---|---|---|---|---|
| Δ Bureaucratic Quality, 1984-2014 | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) |
| Initial Bureaucratic Quality | -1.03*** | -1.00*** | -0.98*** | -0.98*** | -1.05*** | -1.03*** | -1.16*** | -1.08*** | -1.00*** | -0.98*** |
| | (0.14) | (0.10) | (0.13) | (0.10) | (0.14) | (0.10) | (0.16) | (0.14) | (0.13) | (0.11) |
| Precolonial Centralization | | 1.15*** | | 1.02** | | 0.91* | | 0.99** | | 0.98** |
| | | (0.39) | | (0.44) | | (0.45) | | (0.45) | | (0.47) |
| Mean Aid Dependence, 1984-2013 | -6.00** | -2.62 | -4.68* | -2.32 | -4.79** | -2.67 | -5.92** | -2.94 | -5.53** | -2.81 |
| | (2.48) | (2.35) | (2.53) | (2.38) | (2.31) | (2.25) | (2.29) | (2.33) | (2.55) | (2.69) |
| Mean Aid Dependence, 1984-2013 | 0.42 | -0.37 | -0.40 | -0.71 | -0.15 | -0.46 | 1.24 | 0.13 | -0.29 | -0.64 |
| X Initial Bureaucratic Quality | (1.68) | (1.09) | (1.62) | (1.24) | (1.77) | (1.28) | (1.76) | (1.47) | (1.57) | (1.24) |
| Δ Relative GDP per capita, 1984-2013 | | | 0.31* | 0.16 | 0.15 | 0.05 | 0.28 | 0.14 | 0.33** | 0.18 |
| | | | (0.17) | (0.17) | (0.16) | (0.15) | (0.17) | (0.17) | (0.15) | (0.17) |
| Mean Ethnic Tensions, 1984-2013 | | | | | -0.27** | -0.23* | | | | |
| | | | | | (0.12) | (0.13) | | | | |
| Mean Domestic Violence, 1984-2013 | | | | | | | -0.15** | -0.15* | | |
| | | | | | | | (0.07) | (0.08) | | |
| Mean External Violence, 1984-2013 | | | | | | | 0.22* | 0.07 | | |
| | | | | | | | (0.11) | (0.09) | | |
| Oil Production Dummy, 1984-2013 | | | | | | | | | -0.57 | -0.26 |
| | | | | | | | | | (0.47) | (0.45) |
| Constant | 1.72*** | 0.86** | 1.49*** | 0.85** | 2.40*** | 1.67*** | 1.81*** | 1.11** | 1.61*** | 0.93* |
| | (0.27) | (0.38) | (0.29) | (0.39) | (0.44) | (0.57) | (0.30) | (0.43) | (0.32) | (0.47) |
| Observations | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 |
| $R^2$ | 0.70 | 0.77 | 0.73 | 0.77 | 0.76 | 0.79 | 0.76 | 0.80 | 0.73 | 0.77 |
| adj. $R^2$ | 0.67 | 0.74 | 0.69 | 0.73 | 0.72 | 0.75 | 0.71 | 0.75 | 0.69 | 0.73 |

*Notes:* Robust standard errors are shown in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level.

**Table A3.10: Aid Dependence, Precolonial Centralization and Change in Bureaucratic Quality controlling for initial conditions, 1984-1995, OLS estimates**

| Dependent Variable: Δ Bureaucratic Quality, 1984-1995 | OLS (1) | OLS (2) | OLS (3) | OLS (4) | OLS (5) | OLS (6) | OLS (7) | OLS (8) | OLS (9) | OLS (10) |
|---|---|---|---|---|---|---|---|---|---|---|
| Initial Bureaucratic Quality | -0.63*** | -0.62*** | -0.63*** | -0.63*** | -0.63*** | -0.63*** | -0.64*** | -0.64*** | -0.61*** | -0.62*** |
| | (0.14) | (0.14) | (0.15) | (0.16) | (0.16) | (0.16) | (0.17) | (0.17) | (0.17) | (0.18) |
| Precolonial Centralization | | 0.23 | | -0.09 | | -0.09 | | -0.04 | | -0.12 |
| | | (0.58) | | (0.60) | | (0.61) | | (0.61) | | (0.57) |
| Mean Aid Dependence, 1984-1995 | -4.95* | -4.40 | -4.28 | -4.45 | -4.30 | -4.47 | -4.40 | -4.48 | -2.40 | -2.61 |
| | (2.78) | (3.10) | (2.58) | (2.99) | (2.60) | (2.99) | (2.86) | (3.21) | (3.03) | (3.46) |
| Mean Aid Dependence, 1984-1995 x Initial Bureaucratic Quality | 0.52 | 0.32 | -0.17 | -0.13 | -0.16 | -0.12 | -0.02 | -0.01 | -0.69 | -0.65 |
| | (2.43) | (2.35) | (2.30) | (2.41) | (2.32) | (2.42) | (2.67) | (2.74) | (2.33) | (2.47) |
| Δ Relative GDP per capita, 1984-1995 | | | 0.81 | 0.85 | 0.83 | 0.87 | 0.77 | 0.79 | 0.98* | 1.03* |
| | | | (0.52) | (0.57) | (0.62) | (0.63) | (0.55) | (0.59) | (0.49) | (0.54) |
| Mean Ethnic Tensions, 1984-1995 | | | | | 0.01 | 0.01 | | | | |
| | | | | | (0.14) | (0.14) | | | | |
| Mean Domestic Violence, 1984-1995 | | | | | | | -0.05 | -0.04 | | |
| | | | | | | | (0.05) | (0.05) | | |
| Mean External Violence, 1984-1995 | | | | | | | 1.21 | 1.25 | | |
| | | | | | | | (1.55) | (1.48) | | |
| Oil Production Dummy, 1984-1995 | | | | | | | | | 0.44 | 0.44 |
| | | | | | | | | | (0.33) | (0.33) |
| Constant | 1.40*** | 1.24** | 1.47*** | 1.53** | 1.44** | 1.51* | 1.53*** | 1.55** | 1.20*** | 1.29* |
| | (0.27) | (0.52) | (0.27) | (0.57) | (0.54) | (0.83) | (0.30) | (0.59) | (0.38) | (0.64) |
| Observations | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 |
| $R^2$ | 0.47 | 0.47 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | 0.51 | 0.54 | 0.54 |
| adj. $R^2$ | 0.41 | 0.40 | 0.44 | 0.43 | 0.43 | 0.41 | 0.41 | 0.39 | 0.46 | 0.44 |

*Notes:* Robust standard errors are shown in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level.

**Table A3.11: Precolonial Centralization and State Capacity in 2014, additional controls, 2SLS estimates**

| Dependent Variable: Bureaucratic Quality, 2014 | 2SLS (1) | 2SLS (2) | 2SLS (3) | 2SLS (4) | 2SLS (5) | 2SLS (6) | 2SLS (7) | 2SLS (8) |
|---|---|---|---|---|---|---|---|---|
| Precolonial Centralization | 1.61** | 1.77*** | 1.80*** | 1.61** | 1.61** | 1.80*** | 1.70** | 1.45** |
| | (0.78) | (0.67) | (0.69) | (0.75) | (0.68) | (0.46) | (0.70) | (0.58) |
| Slave Exports (area) | -0.02 | | | | | | | |
| | (0.04) | | | | | | | |
| State Antiquity | | -0.20 | | | | | | |
| | | (0.49) | | | | | | |
| Years of Ancient State History | | | -0.09 | | | | | |
| | | | (0.19) | | | | | |
| Vertical Legitimacy | | | | -0.02 | | | | |
| | | | | (0.30) | | | | |
| Fractal Dimension | | | | | 0.39 | | | |
| | | | | | (9.52) | | | |
| Mean Gold Production per capita, 1970-2000 | | | | | | 0.02 | | |
| | | | | | | (0.02) | | |
| Mean Oil Production per capita, 1970-2000 | | | | | | 0.01 | | |
| | | | | | | (0.03) | | |
| Diamond Production per capita, 1970-2000 | | | | | | 0.00 | | |
| | | | | | | (0.04) | | |
| Executive Constraints in Independence Year | | | | | | | -0.02 | |
| | | | | | | | (0.06) | |
| Mean Executive Constraints, 1961-2013 | | | | | | | | 0.09 |
| | | | | | | | | (0.07) |
| Constant | 0.45 | 0.32 | 0.75 | 0.37 | 0.38 | 0.43 | 0.40 | 0.19 |
| | (0.63) | (0.42) | (0.94) | (0.43) | (0.62) | (0.51) | (0.65) | (0.46) |
| Observations | 35 | 32 | 32 | 30 | 34 | 35 | 35 | 35 |
| $R^2$, second stage | 0.31 | 0.33 | 0.33 | 0.23 | 0.33 | 0.30 | 0.30 | 0.33 |
| adj. $R^2$, second stage | 0.27 | 0.28 | 0.29 | 0.17 | 0.28 | 0.20 | 0.25 | 0.29 |
| *F* statistic, first stage | 6.51 | 10.26 | 11.53 | 9.90 | 10.50 | 17.23 | 12.19 | 8.82 |
| Wooldridge's heteroskedasticity-robust score test (p-value in brackets) | .313 | .267 | .253 | .234 | .131 | .871 | .421 | .093 |
| | (0.576) | (0.605) | (0.615) | (0.628) | (0.717) | (0.351) | (0.517) | (0.760) |

*Notes:* Robust standard errors are shown in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level. The variables *Slave Exports*, *Years of Ancient State History, Fractal Dimension, Gold Production, Oil Production and Diamond Production* are log transformed. The instrument for precolonial centralization is the "national" TseTse Suitability Index (TSI) which is constructed by the authors.

| Dependent Variable: Bureaucratic Quality, 2014 | 2SLS (9) | 2SLS (10) | 2SLS (11) | 2SLS (12) | 2SLS (13) | 2SLS (14) | 2SLS (15) | 2SLS (16) |
|---|---|---|---|---|---|---|---|---|
| Precolonial Centralization | 1.79*** | 1.15 | 0.87 | 1.60*** | 1.86** | 1.61*** | 1.65*** | 1.79*** |
| | (0.62) | (0.94) | (0.73) | (0.61) | (0.94) | (0.60) | (0.62) | (0.56) |
| Years of Independence | -0.00* | | | | | | | |
| | (0.00) | | | | | | | |
| Gross public revenue per capita, 1925 | | -0.49 | | | | | | |
| | | (0.40) | | | | | | |
| Mean GDP per capita, 1970s (constant 2005 USD) | | | -0.22 | | | | | |
| | | | (0.38) | | | | | |
| Mean GDP per capita, 1980s (constant 2005 USD) | | | -0.59 | | | | | |
| | | | (0.65) | | | | | |
| Mean GDP per capita, 1990s (constant 2005 USD) | | | 0.31 | | | | | |
| | | | (0.42) | | | | | |
| Mean GDP per capita, 2000s (constant 2005 USD) | | | 0.56 | | | | | |
| | | | (0.41) | | | | | |
| Communist Legacy | | | | -0.35** | | | | |
| | | | | (0.17) | | | | |
| European Descent in 1900 | | | | | -0.06 | | | |
| | | | | | (0.06) | | | |
| Ethnolinguistic Fractionalization | | | | | | -0.05 | | |
| | | | | | | (0.38) | | |
| Polarization Index | | | | | | | 0.13 | |
| | | | | | | | (0.68) | |
| Catholic | | | | | | | | 0.00 |
| | | | | | | | | (0.01) |
| Protestant | | | | | | | | 0.01 |
| | | | | | | | | (0.01) |
| Muslim | | | | | | | | 0.00 |
| | | | | | | | | (0.01) |
| Constant | 0.43 | 0.84 | 0.42 | 0.42 | 0.32 | 0.37 | 0.27 | 0.05 |
| | (0.46) | (0.52) | (0.73) | (0.42) | (0.53) | (0.55) | (0.40) | (0.39) |
| Observations | 35 | 20 | 32 | 35 | 33 | 32 | 32 | 35 |
| $R^2$, second stage | 0.29 | 0.24 | 0.47 | 0.33 | 0.24 | 0.34 | 0.30 | 0.30 |
| adj. $R^2$, second stage | 0.25 | 0.15 | 0.37 | 0.29 | 0.19 | 0.29 | 0.25 | 0.21 |
| *F* statistic, first stage | 14.38 | 8.58 | 6.66 | 16.62 | 7.76 | 14.52 | 13.69 | 9.70 |
| Wooldridge's heteroskedasticity-robust score test (p-value in brackets) | .556 | 0.009 | .003 | .186 | .303 | .116 | .262 | .763 |
| | (0.456) | (0.923) | (0.954) | (0.666) | (0.582) | (0.733) | (0.609) | (0.382) |

*Notes:* Robust standard errors are shown in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level. The variable *GDP per capita* is log transformed. The instrument for precolonial centralization is the "national" TseTse Suitability Index (TSI) which is constructed by the authors.

**Table A3.12: Precolonial Centralization and Average State Capacity 1996-2014, additional controls, 2SLS estimates**

| Dependent Variable: Mean Bureaucratic Quality, 1996-2014 | 2SLS (1) | 2SLS (2) | 2SLS (3) | 2SLS (4) | 2SLS (5) | 2SLS (6) | 2SLS (7) | 2SLS (8) |
|---|---|---|---|---|---|---|---|---|
| Precolonial centralization | 1.43* | 1.39* | 1.86*** | 1.86*** | 1.54** | 1.63** | 1.68** | 1.40** |
| | (0.77) | (0.72) | (0.66) | (0.66) | (0.75) | (0.70) | (0.71) | (0.62) |
| Slave Exports (area) | -0.04 | | | | | | | |
| | (0.04) | | | | | | | |
| Slave Exports (population) | | -0.05 | | | | | | |
| | | (0.04) | | | | | | |
| State Antiquity | | | -0.50 | | | | | |
| | | | (0.49) | | | | | |
| Years of Ancient State History | | | | -0.18 | | | | |
| | | | | (0.18) | | | | |
| Vertical Legitimacy | | | | | -0.13 | | | |
| | | | | | (0.37) | | | |
| Fractal Dimension | | | | | | 3.93 | | |
| | | | | | | (9.40) | | |
| Executive Constraints in Independence Year | | | | | | | -0.01 | |
| | | | | | | | (0.06) | |
| Mean Executive Constraints, 1961-1996 | | | | | | | | 0.09 |
| | | | | | | | | (0.06) |
| Constant | 0.61 | 1.00 | 0.36 | 1.18 | 0.39 | 0.25 | 0.33 | 0.23 |
| | (0.62) | (0.75) | (0.43) | (0.92) | (0.43) | (0.65) | (0.64) | (0.42) |
| Observations | 35 | 35 | 32 | 32 | 30 | 34 | 35 | 35 |
| $R^2$, second stage | 0.31 | 0.32 | 0.26 | 0.28 | 0.20 | 0.29 | 0.25 | 0.30 |
| adj. $R^2$, second stage | 0.26 | 0.28 | 0.21 | 0.23 | 0.14 | 0.25 | 0.20 | 0.26 |
| F-statistic, first stage | 6.51 | 7.10 | 10.26 | 11.35 | 9.90 | 10.50 | 12.19 | 8.02 |
| Wooldridge's heteroskedasticity-robust score test (p-value in brackets) | .408 | .423 | .669 | .579 | .261 | .268 | .621 | .236 |
| | (0.523) | (0.516) | (0.414) | (0.447) | (0.609) | (0.605) | (0.431) | (0.627) |

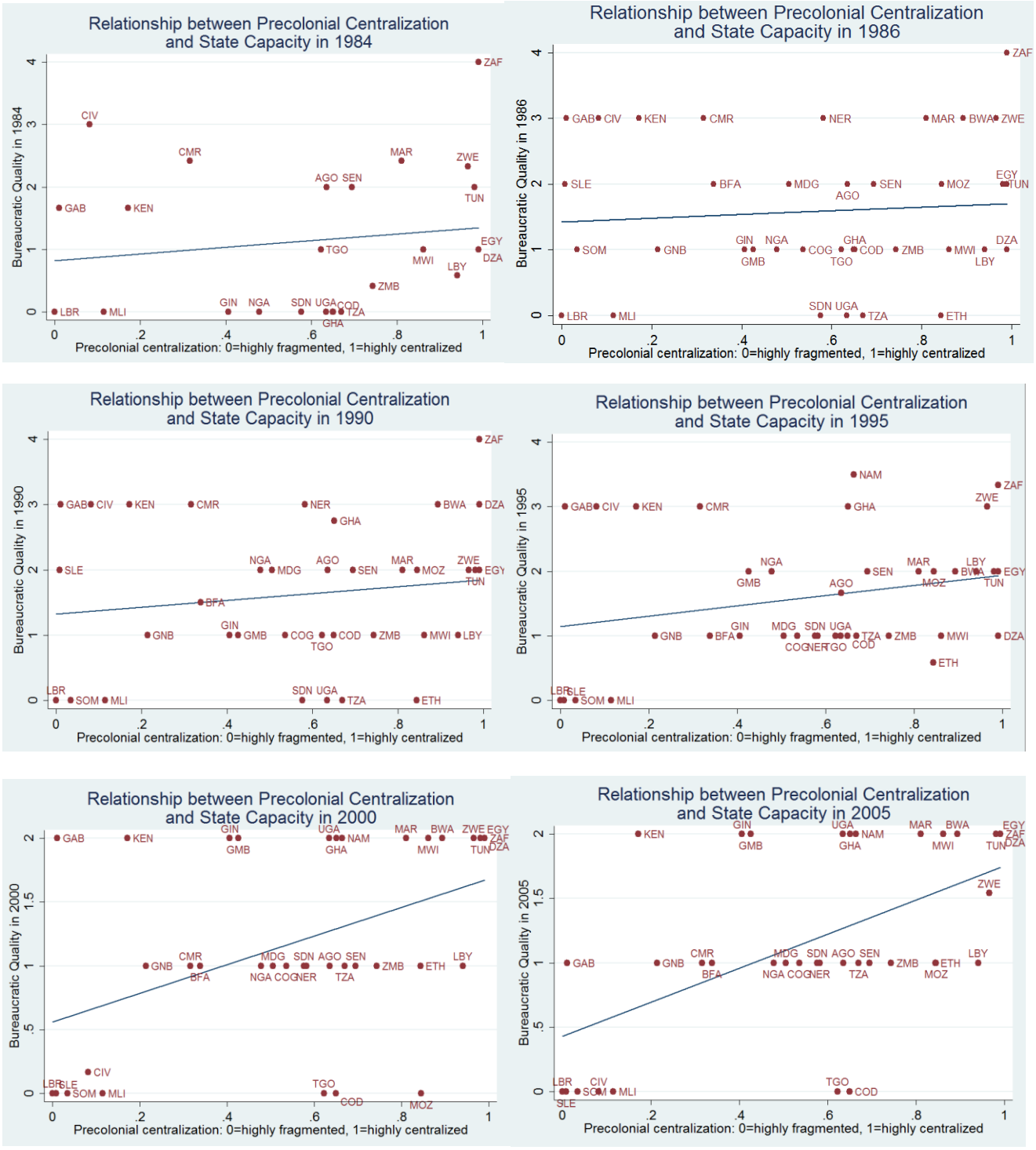
*Notes:* Robust standard errors are shown in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level. The variables *Slave Exports*, *Years of Ancient State History,* and *Fractal Dimension* are log transformed. The instrument for precolonial centralization is the "national" TseTse Suitability Index (TSI) which is constructed by the authors.

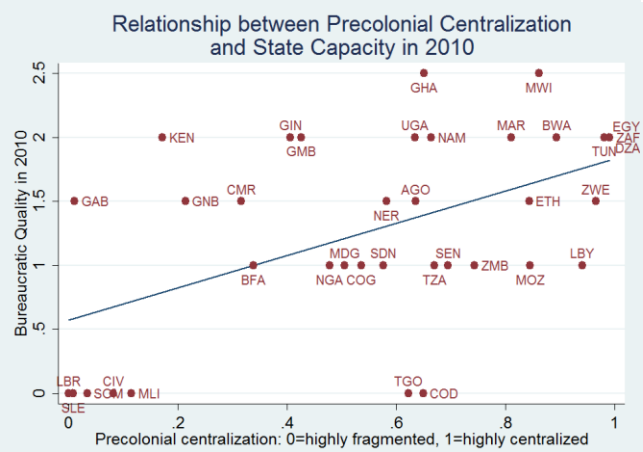
| Dependent Variable:<br>Mean Bureaucratic Quality, 1996-2014 | 2SLS<br>(9) | 2SLS<br>(10) | 2SLS<br>(11) | 2SLS<br>(12) | 2SLS<br>(13) | 2SLS<br>(14) | 2SLS<br>(15) | 2SLS<br>(16) |
|---|---|---|---|---|---|---|---|---|
| Precolonial Centralization | 1.76*** | 0.70 | 1.51*** | 1.51** | 2.06* | 1.55** | 1.59** | 1.77*** |
| | (0.63) | (0.84) | (0.58) | (0.60) | (1.18) | (0.62) | (0.63) | (0.54) |
| Years of Independence | -0.00** | | | | | | | |
| | (0.00) | | | | | | | |
| Gross public revenue per capita, 1925 | | -0.39 | | | | | | |
| | | (0.41) | | | | | | |
| Mean GDP per capita, 1970s (constant 2005 USD) | | | -0.62** | | | | | |
| | | | (0.30) | | | | | |
| Mean GDP per capita, 1980s (constant 2005 USD) | | | 0.61** | | | | | |
| | | | (0.30) | | | | | |
| Communist Legacy | | | | -0.46*** | | | | |
| | | | | (0.17) | | | | |
| European Descent in 1900 | | | | | -0.03 | | | |
| | | | | | (0.04) | | | |
| Ethnolinguistic Fractionalization | | | | | | -0.04 | | |
| | | | | | | (0.40) | | |
| Polarization Index | | | | | | | -0.07 | |
| | | | | | | | (0.66) | |
| Catholic | | | | | | | | 0.00 |
| | | | | | | | | (0.01) |
| Protestant | | | | | | | | 0.01 |
| | | | | | | | | (0.01) |
| Muslim | | | | | | | | 0.00 |
| | | | | | | | | (0.01) |
| Constant | 0.40 | 1.00** | 0.45 | 0.46 | 0.14 | 0.38 | 0.39 | 0.12 |
| | (0.46) | (0.47) | (0.86) | (0.41) | (0.65) | (0.59) | (0.41) | (0.37) |
| Observations | 35 | 20 | 32 | 35 | 35 | 32 | 32 | 35 |
| $R^2$ | 0.25 | 0.16 | 0.36 | 0.32 | 0.17 | 0.31 | 0.29 | 0.26 |
| adj. $R^2$ | 0.20 | 0.07 | 0.29 | 0.28 | 0.12 | 0.26 | 0.24 | 0.16 |
| F-statistic, first stage | 14.38 | 8.58 | 12.07 | 16.63 | 5.04 | 14.51 | 13.69 | 9.70 |
| Wooldridge's heteroskedasticity-robust score test (p-value in brackets) | .804 | .060 | .424 | .265 | .641 | .221 | .321 | 1.186 |
| | (0.370) | (0.807) | (0.515) | (0.606) | (0.423) | (0.638) | (0.571) | (0.276) |

*Notes:* Robust standard errors are shown in parentheses. ***denotes significance at the 1% level, ** at the 5% level, *at the 10% level. The variable *GDP per capita* is log transformed. The instrument for precolonial centralization is the "national" TseTse Suitability Index (TSI) which is constructed by the authors.

## APPENDIX 4: LIST OF FIGURES

**Figure A4.1:** Scatterplots visualizing the relationship between precolonial centralization and state capacity




Relationship between Precolonial Centralization and State Capacity in 2010
Bureaucratic Quality in 2010
0
.5
1
1.5
2
2.5
GHA
MWI
KEN
GIN
GMB
UGA
NAM
MAR
BWA
EGY
ZAF
TUN
DZA
GAB
GNB
CMR
AGO
NER
ETH
ZWE
BFA
MDG
SDN
NGA
COG
SEN
TZA
ZMB
MOZ
LBY
LBR
CIV
SOM
MLI
SLE
TGO
COD
0
.2
.4
.6
.8
1
Precolonial centralization: 0=highly fragmented, 1=highly centralized

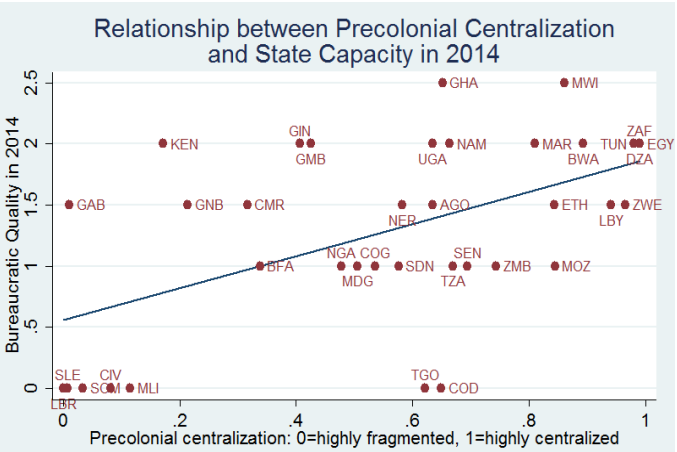
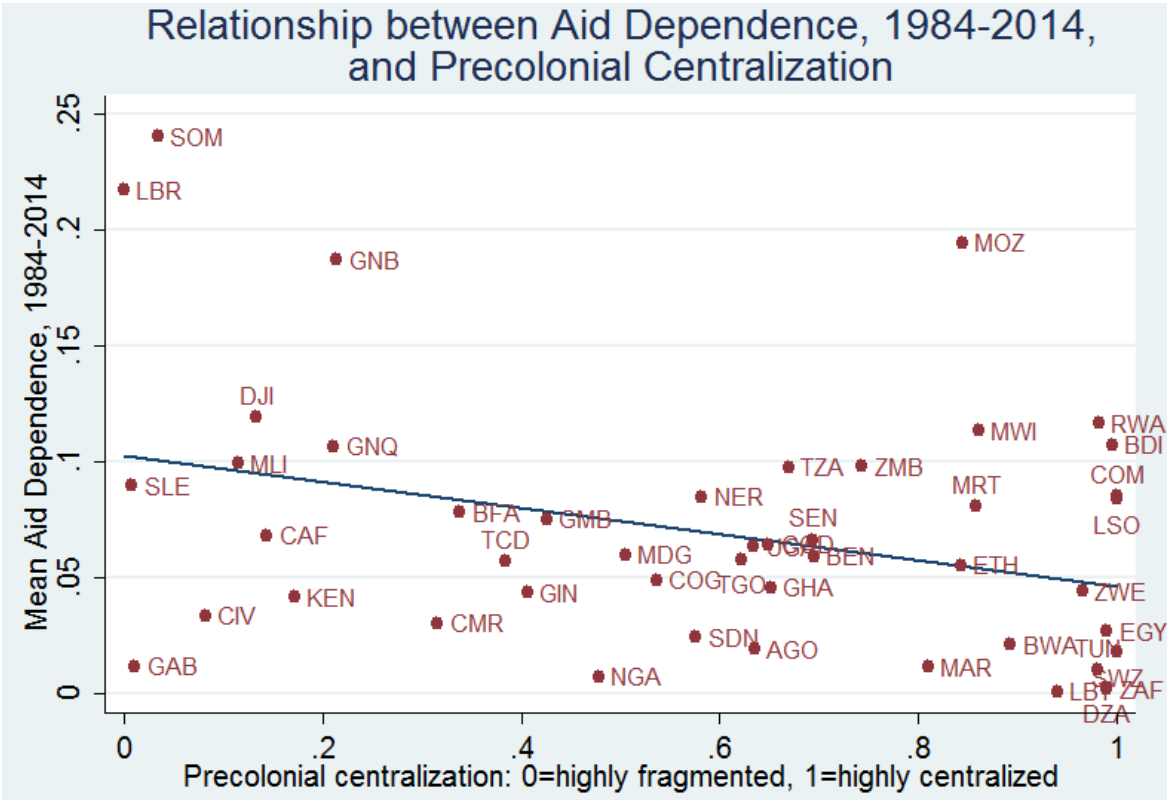
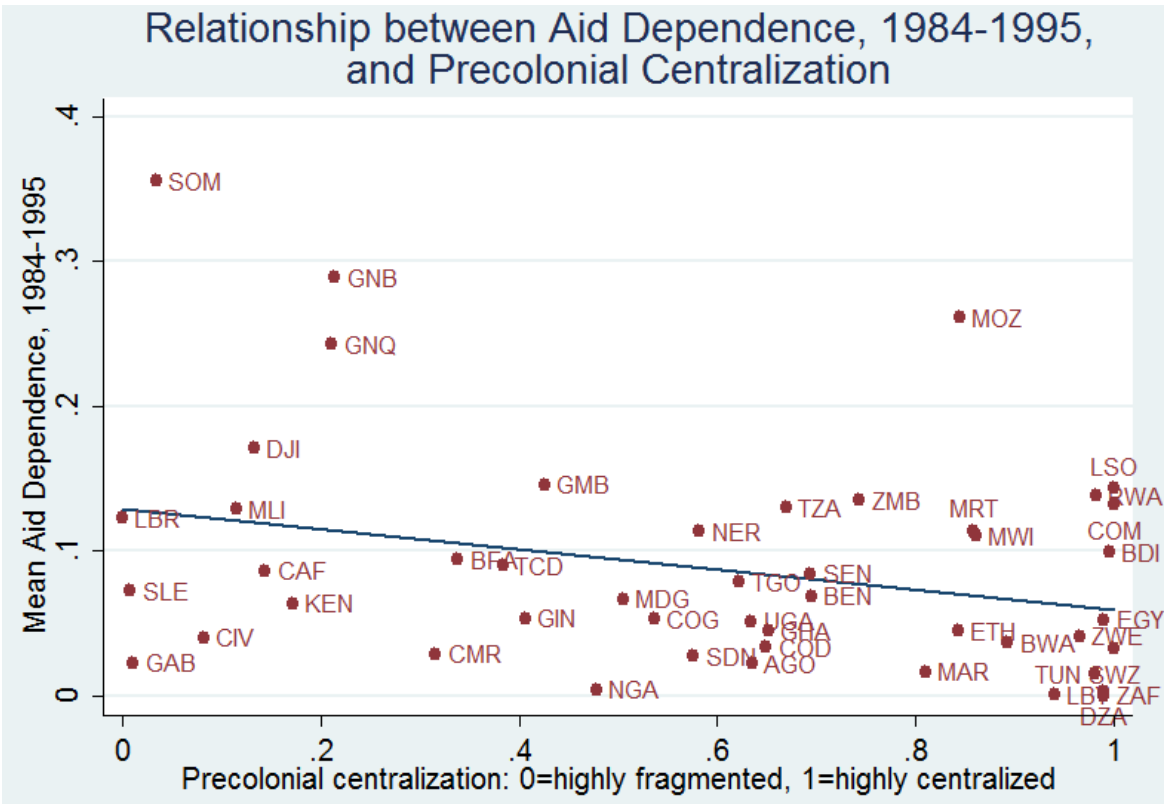
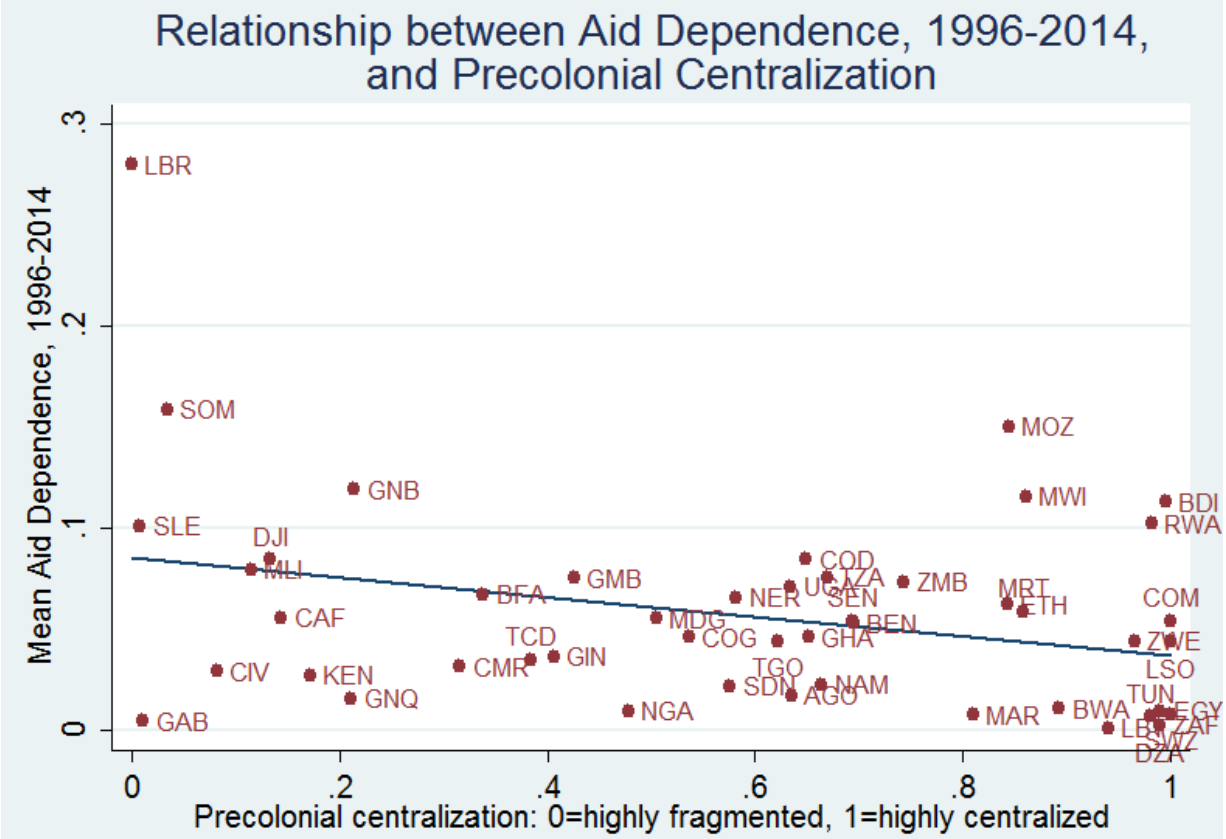

Relationship between Precolonial Centralization and State Capacity in 2014
Bureaucratic Quality in 2014
0
.5
1
1.5
2
2.5
GHA
MWI
KEN
GIN
GMB
UGA
NAM
MAR
ZAF
TUN
EGY
BWA
DZA
GAB
GNB
CMR
AGO
NER
ETH
ZWE
LBY
BFA
NGA
COG
MDG
SDN
SEN
TZA
ZMB
MOZ
SLE
CIV
SOM
MLI
LBR
TGO
COD
0
.2
.4
.6
.8
1
Precolonial centralization: 0=highly fragmented, 1=highly centralized

**Figure A4.2:** Scatterplots visualizing the relationship between precolonial centralization and aid dependence



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